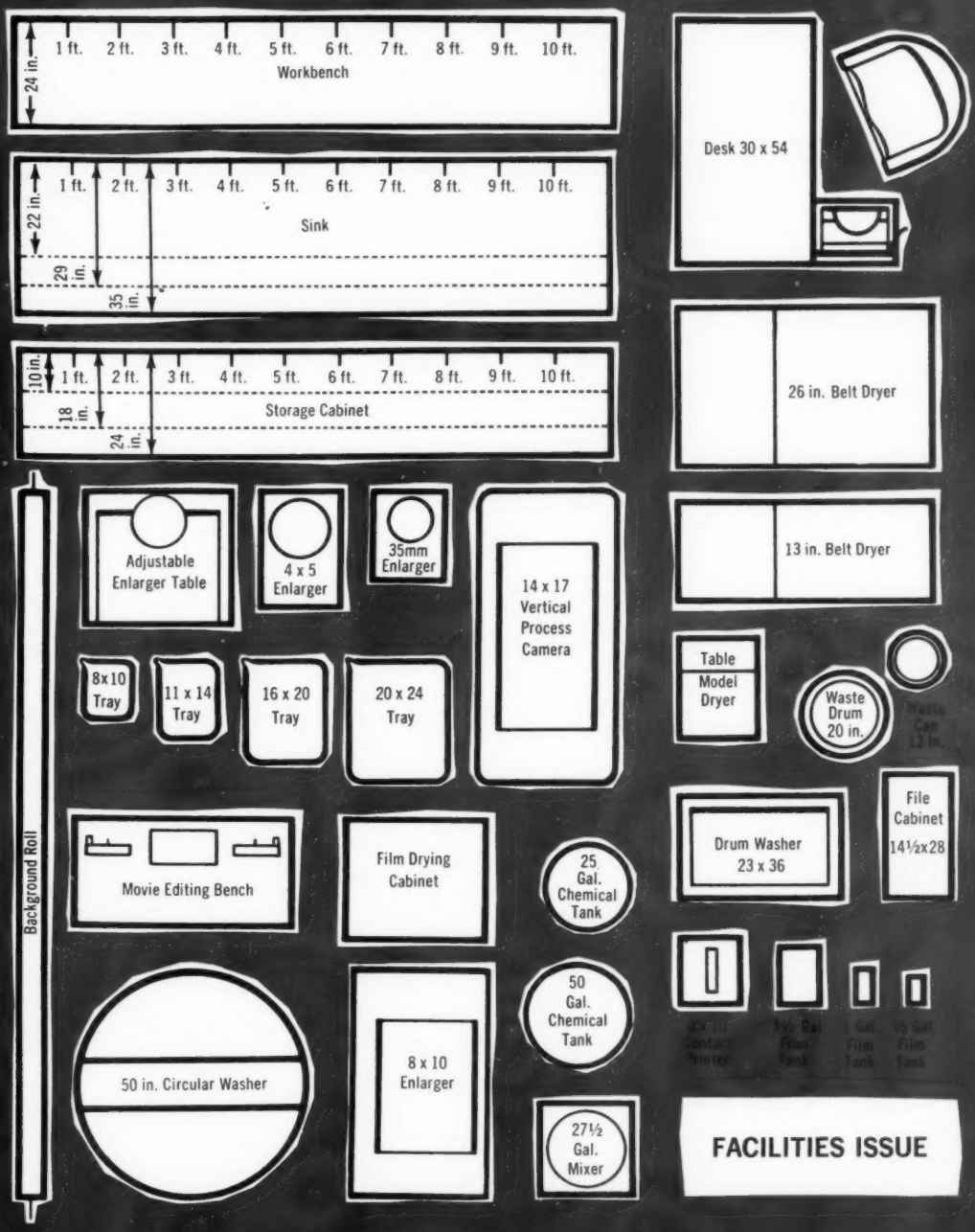
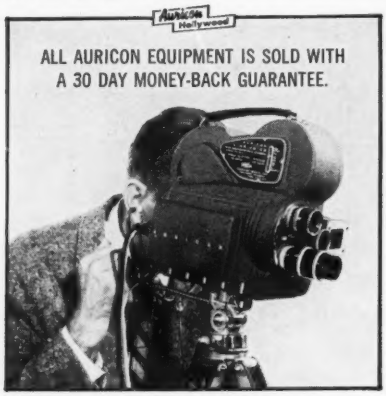
PMI

VOL. 1 NO. 5
AUGUST
1951
PRICE 30c

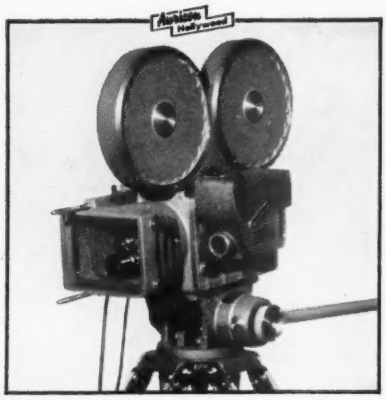
PHOTO METHODS FOR INDUSTRY



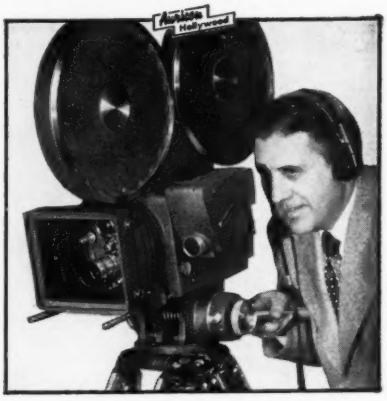
AURICON 16mm Sound-On-Film for Professional Results!



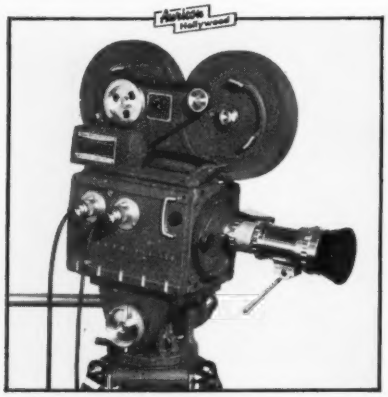
"CINE-VOICE II" 16 mm Optical Sound-On-Film Camera. ✱ 100 ft. film capacity for 2¾ minutes of recording; 6-Volt DC Convertor or 115-Volt AC operation. ✱ $998.50 (and up).



"AURICON PRO-600" 16mm Optical Sound-On-Film Camera. ✱ 600 ft. film capacity for 16½ minutes of recording. ✱ $1871.00 (and up) with 30 day money-back guarantee.

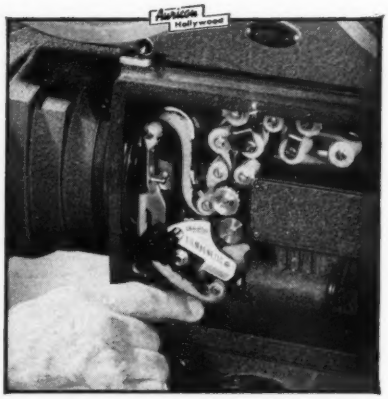


"SUPER 1200" 16 mm Optical Sound-On-Film Camera. ✱ 1200 ft. film capacity for 33 minutes of recording. ✱ $5667.00 (and up) complete for "High-Fidelity" Talking Pictures.



"PRO-600 SPECIAL" 16mm Light-Weight Camera. ✱ 400 ft. film capacity for 11 minutes of recording. ✱$1,295.00 (and up).

PORTABLE POWER SUPPLY UNIT — Model PS-21..Silent in operation, furnishes 115-Volt AC power to drive "Single System" or "Double System" Auricon Equipment from 12 Volt Storage Battery, for remote "location" filming. ✱$269.50



FILMAGNETIC — Finger points to Magnetic pre-stripe on unexposed film for recording lip-synchronized magnetic sound with your picture. Can be used with all Auricon Cameras. ✱ $960.00 (and up).

TRIPOD — Models FT-10 and FT-10S12... Pan-Tilt Head Professional Tripod for velvet-smooth action. Perfectly counter-balanced to prevent Camera "dumping." ✱ $406.25 (and up).

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If it's profit you're after in the production of 16 mm Sound-On Film Talking Pictures, Auricon Cameras provide ideal working tools for shooting profitable Television Newsreels, film commercials, inserts, and local candid-camera programming. Now you can get Lip-Synchronized Optical or Magnetic Sound WITH your picture using Auricon 16 mm Sound-On-Film Cameras. Precision designed and built to "take it."

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Watch for new developments from FONDA!

Mobile Model "Beta", a universal all-stainless steel 16mm continuous processor, is now in production. Can be adapted to process B & W negative and positive, or converted to positive Color Reversal. Production speed up to 1200 feet per hour for Military, TV, News Service, or Microfilming applications.

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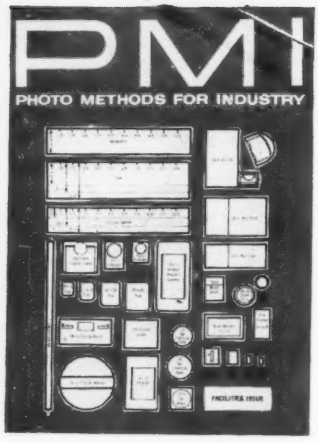

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Dust & Dirt *David B. Eisendrath, Jr.* This persistent photographic evil is especially bedeviling for industrial men. How to plan and use your facilities to keep foreign matter foreign

Weather *Herbert P. Paschel* People are sensitive to heat and moisture, and so is photographic material. The question is how to keep both personnel and results happy

Agitation *Samuel Lang* A discussion of one of the most critical aspects of photographic processing, including the benefits and limitations of both manual and mechanical methods

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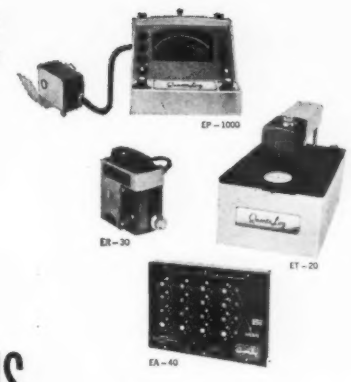
VERSATILITY WITHOUT LIMITATION WITH THE QUANTALOG MODEL EP-1000

photographic color analyzer and attachments



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▪ With these attachments (and there are more to come) and the greater all-around sensitivity, stability and ease of use inherent in the EP-1000 Photometer, you have *versatility without limitation,* an instrument line without equal, designed to grow with your need. For descriptive Brochure or a demonstration of the Macbeth QuantaLog Model EP-1000 and attachments, please circle the control number shown below.

Get more information. Circle 442, page 69

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Newburgh, New York

BOLEX GETS THE IMPACT STORY FOR ACF INDUSTRIES

Bolt a Bolex 16mm camera to a freight car ready to bump?

Research engineers at ACF Industries, Berwick, Pa., devised such a test to measure impact and called their Photo Department. ACF photographers, who devote a majority of their time to taking research shots, thought the request outlandish. "Precision cameras are simply not built with this kind of usage in mind," they argued. But the engineers said it was necessary if the test was to succeed and considered the camera expendable. The 16mm Bolex was bolted to the freight car and . . . WHAM! The car was bumped against another freight car . . .

The 16mm Bolex recorded every jarring frame of the collision and came away good as new!

Another exacting assignment for Bolex was to help measure impact on ACF's retractable hitches for truck trailers riding piggyback on flatcars. Through analysis of the Bolex films, engineers could see in detail how the springing arrangement responded to loads.

As you can see, Bolex equipment gets plenty of rough use at ACF. Two Bolex 16mm cameras—with a variety of Switar and Yvar lenses—are mainstays. Neither Bolex, one of them 12 years old, has ever given a speck of trouble.

ACF photographers use Bolex because it is rugged, dependable and offers lightweight compactness and sharp picture quality.

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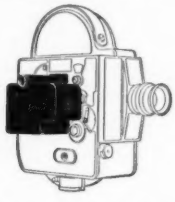
. . . Another example of Bolex getting the job done for the professional!

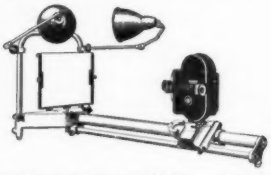
Bolex Cameras and Accessories
For Every Professional Effect

Bolex Tripod: *Lightweight aluminum construction. Smooth-action pan head tilts 135 degrees vertically. With cable release, $99.50.*

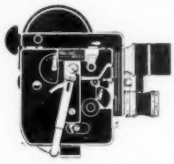


Bolex Unimotor: *Electric motor drives camera through full roll of film at constant speed. Batteries or AC current. $89.50.*

Precision-Ground Lenses: *Switar 10mm f/1.6 extreme wide angle, $149.50; Switar 25mm f/1.4 normal lens, $168.00; Switar 75mm f/1.9 extra-fast telephoto, $145.00.*



Bolex 16mm Super Titler: *Basic Kit—optical bench, main frame, two reflectors, title frame and sliding cradle—$180.50.*



Bolex H-16 Rex: *Reflex viewing, variable shutter, 3 lens turret. With superb Lytar f/1.8 lens—$450.00.*

Bolex cameras and accessories offer the utility for professional work many studios have paid thousands of dollars for. Write for literature and the name of your nearest Bolex dealer.

All prices include F.E.T. where applicable.

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BOLEX

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F.Y.I.

If you haven't yet puzzled out the photo below, it shows an ice-coated fire escape after a spectacular blaze in Rochester, N.Y. Taken by **Peter P. Chiesa,** an employee at the Kodak Research Labs, it received the Grand Award at the 26th Kodak International Salon of Photography, held in Paris.

Speaking of honors, **Dennis L. Crow**, member of the Industrial Photographers Assn. of America, was awarded the *Asbury Park Press* Trophy at the annual Red Bank, N.J., "Festival of Arts." Firemen also contributed to this winning photograph which shows a fire-fighting demonstration at an oil refinery. Mr. Crow is a photographic specialist with the Esso Research and Engineering Co., by the way.

Still in the Awards Department is a note from Gevaert telling us of a gold medal presented to **Dr. Andre Rott**, inventor of Gevaert's diffusion-transfer process. He received the Gold Union Medal from the Photographic Society in Vienna for his original researches in the field of techniques for reproduction of documents.

Election news from the various photographic organizations keep trickling in, and here are some of the late returns. **William H. Metzger**, Manager of the Motion Picture Div., Ansco Corp., has been elected chairman of the New York Section of the SMPTE to fill the unexpired term of **James Kaylor,** who has joined MGM labs in California. **Boyce Nemec**, Executive VP of Reevesound Co., Inc., has been named to the Board of Managers of the same group.

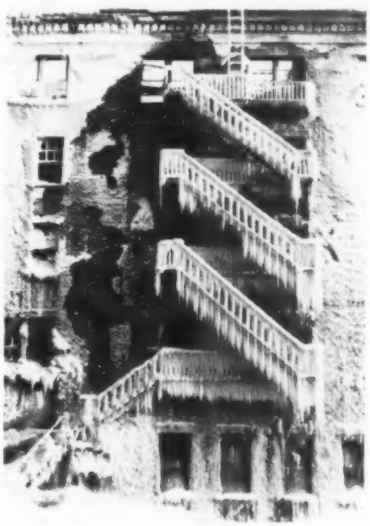
News Photographer **Hubert A. McClain** of Long Beach, Calif., has been elected President of the Southern California Chapter, Biological Photographic Assoc.

If your organization elects officers—and if you're proud of them—let us know and we'll pass the news along. We also list events of interest and organizational meetings in our snappy little feature called "Coming Up." Please send us dates and information on such, 3 or 4 months in advance.

An enterprising group called the International Society for Photogrammetry has given us a *year's* notice on its Symposium on Photo Interpretation. This event will be held from Aug. 30 to Sept. 5, 1962, at the International Training Centre for Aerial Survey, Delft, The Netherlands. Write to the Secretariat of Commission VII, I.S.P., at the above address.

Speaking of Europe, our old Gypsy blood began to bubble when we received news of an affair to be held in **Budapest** this coming Nov. 16-25. It's the 2nd International Festival of Technical and Scientific Films and Session of the Popular Science Section of I.S.F.A. Contact Four Seasons Travel, 5705 Chene St., Detroit.

Florman & Babb, Inc., the New York equipment house, is planning a Workshop-Seminar in animation film techniques. The first such program, held last June, drew over 100 people, including representatives from industry, education and the military. More than twice that number is expected this year. If you'd like to participate, contact Charles Lipow, Florman & Babb, Inc., 68 W. 45 St., New York 36.



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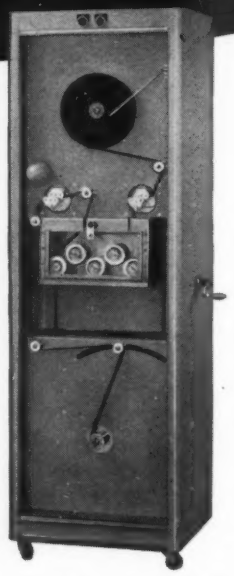

Model A-5100 combination 16/35 mm film cleaner. Other cleaners available for 16 mm film only, 35 mm film only and for 70 mm film only. Price: Model A-5100 $5,500 f.o.b. Sylmar, California.

2.

Use the
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Unicorn 35 mm Automatic Film Splicer. Two other standard models available for 16 and 70 mm film stock. Price: (35 mm model) $2200.00, f.o.b. Sylmar, California.

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Get more information. Circle 414, page 69

COMING UP

AUGUST 19-23 Techniques of High-Speed Photography Seminar, directed by Professor Harold E. Edgerton. MIT, Cambridge, Mass.

AUGUST 21-24 Biological Photographic Association Annual Meeting. Hotel Knickerbocker, Chicago.

SEPTEMBER 3-9 National Consultation, Committee on A-V and Broadcast Education, National Council of Churches, Green Lake, Wis.

SEPTEMBER 20-21 Industrial Electronics Symposium. Bradford Hotel, Boston.

OCTOBER 27 Photographic Manufacturers & Distributors Assoc., Charter Jet Flight to Europe and the International Photographic Show in Paris, Contact Edward Donovan, 480 Lexington Ave., New York 17, N. Y.

MONTHLY MEETINGS

Association of Federal Photographers Meetings every third Wednesday at 8 p.m. G.S.A. Building, 7th and D Sts., S.W., Washington, D. C.

Binghamton Chapter SPSE Meetings every third Tuesday. Contact H. G. Morse, Ansco, Binghamton, N. Y. RA 2-4221, Ext. 573.

Boston Chapter SPSE Contact John Taylor, Itek Corp., 10 Maguire Rd., Lexington, Mass. VO 2-6200.

Chicago Chapter Biological Photographic Assoc. Meetings every third Tuesday. Contact Dorothy Pinkham, 551 W. Grant Pl., Chicago. DI 8-6400.

Cleveland Chapter SPSE Meetings the first Tuesday of each month. Cleveland Engineering & Scientific Center, 3100 Chester Ave., Cleveland, Ohio. Contact Robert E. Birr, General Electric, Nela Park, Cleveland. GL 1-6600.

Industrial Photographers of America Essex House, Newark, N. J. Meetings every second and fourth Thursday. Contact Tom Holberton, 181 Lake Drive West, Packanack Lake, Wayne, N. J. or R. Handley, The Port of New York Authority, 111 8th Ave., N.Y.C.

(continued on page 10)

The Completely Automatic amplomatic

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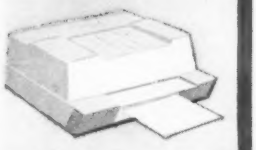

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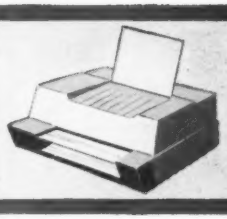

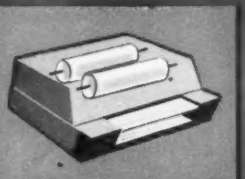

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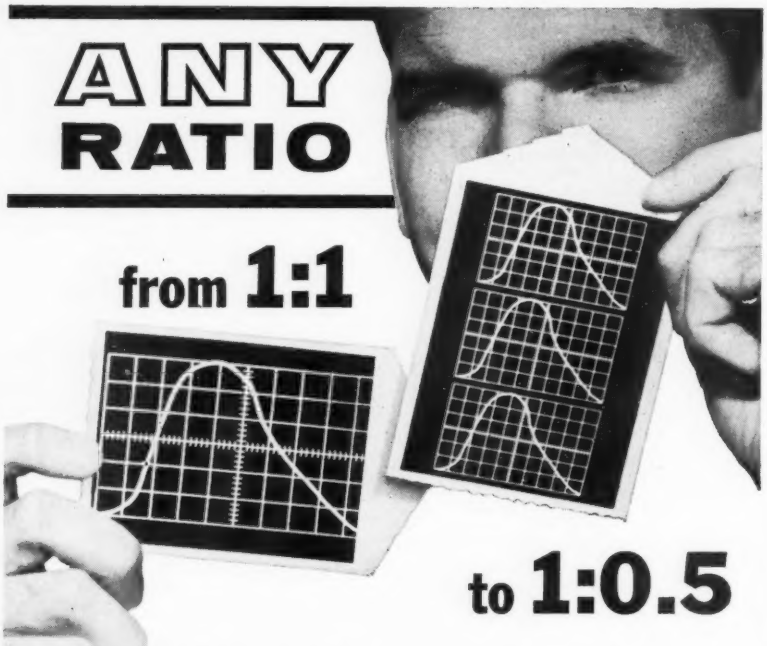

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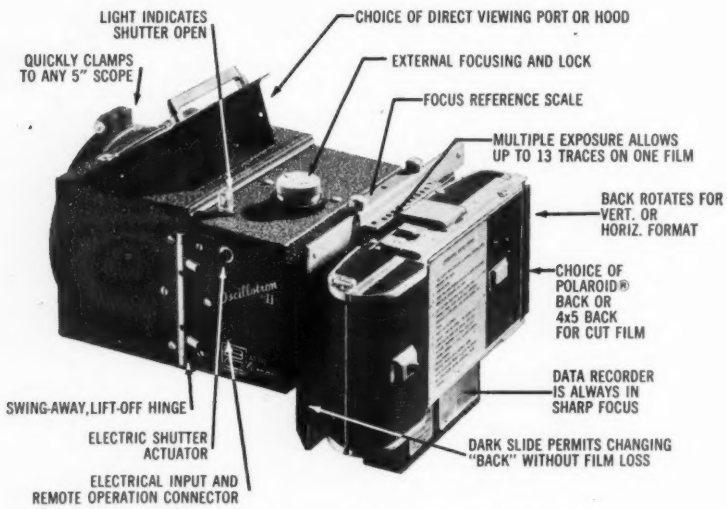
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Get more information. Circle 407, page 69

COMING UP

(continued from page 8)

Manhattan Chapter Society of Reproduction Engineers Meetings every third Monday. Contact J. Ryerson, Joseph Dixon Crucible Co., Newark 2, N. J. Telephone DE 3-3000.

Midwest Industrial Photographers Association Contact John E. Scrage, c/o Deere & Co., Photo Department, 3300 River Drive, Moline, Ill.

National Visual Presentation Association, Inc. New York City. Meetings every second Thursday. Contact M. E. Shack, 19 W. 4th Street, New York, N. Y. Telephone MU 2-2294.

New York Chapter SPIE Meetings every third Thursday. Contact Don Bass, P.O. Box 177, Bethpage, L. I., N. Y. Telephone Liggett 4-8196.

New York City Chapter SMPTE Meetings first or second Wednesday of each month. Contact Ed Warnecke, Eastman Kodak Co., 342 Madison Ave., New York City. MU 7-7080.

New York City Chapter SPSE Monthly programs. Contact Richard H. Haard, Bell Telephone Labs., N.J. CH 3-1000, Murray Hill Ext. 2182.

Northern California Chapter, Biological Photographic Assoc. Meetings every 4th Friday. Contact Cecile D. Kinney, U.S. Naval Radiological Defense Laboratory, San Francisco, Calif. Code 227 MI 8-6900 ext. 564.

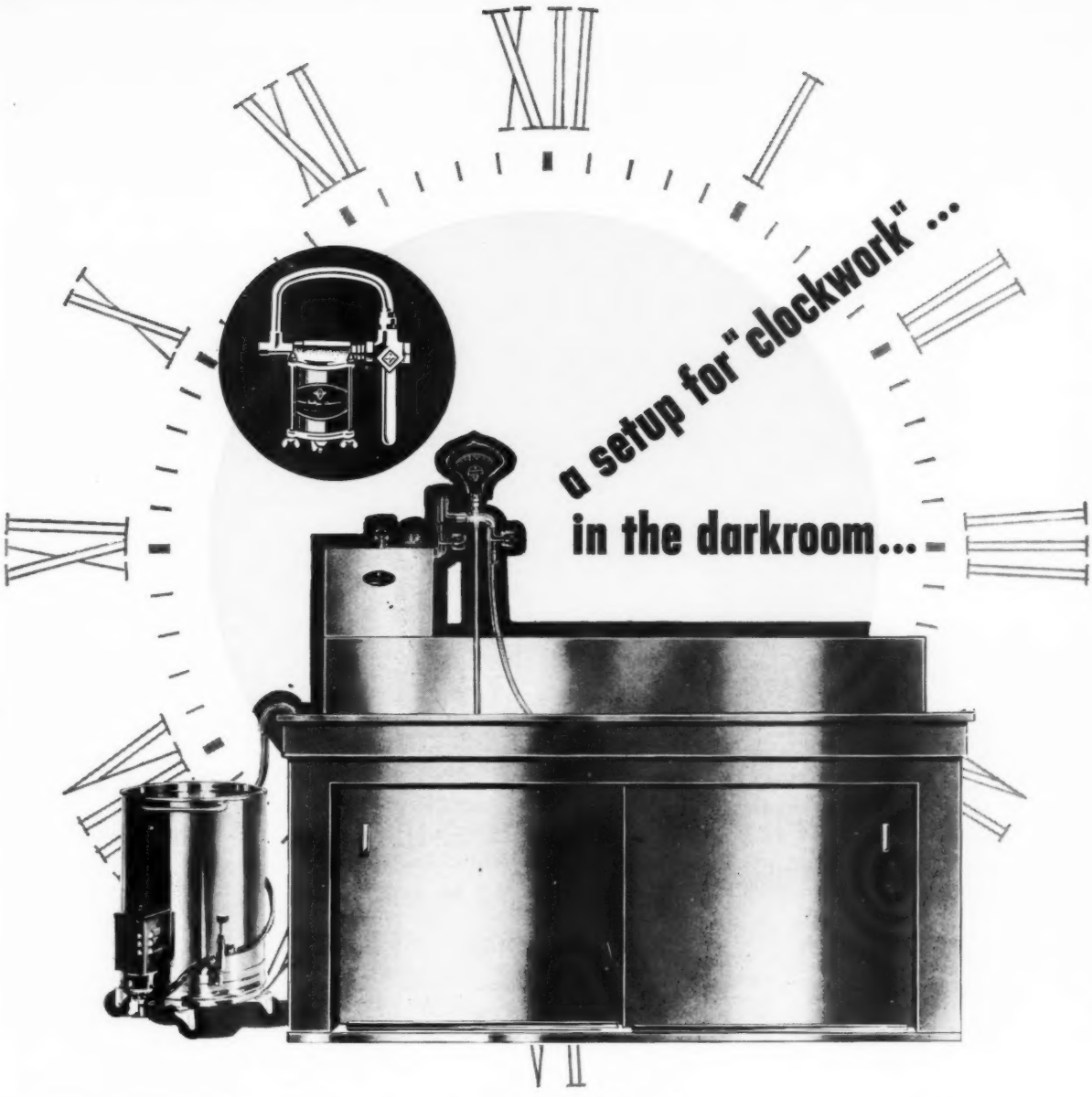
Rochester Chapter SPSE Second Thursday. Contact Woodlief Thomas, Jr. Color Technology Division, Building 65, Kodak Park, Rochester 4, N. Y. Telephone CO 6-2500.

Rocky Mountain Industrial Photographers Meetings every fourth Monday. Contact P. H. Broadie, 2170 S. Lincoln, Denver 10, Colo. PEarl 3-2200.

Southern California Chapter, Biological Photographic Assoc. Meetings every third Thursday. Contact Avis Gregersen Warner, Box 78, 1200 N. State St., Los Angeles 33, Calif. Telephone CA 5-3131 ext. 7-1319.

Southern California Chapter SPSE Meetings the last Monday of each month. Contact Ben Augustine, 235 Annandale Rd., Pasadena 2, Calif. Telephone MU 1-0076.

Southern California Chapter Industrial Photographers Meetings every third Tuesday. Contact Janet Marshall, Executive Secretary, 5463 Virginia Ave., Los Angeles 29, Calif. HO 5-6614.



The smooth running efficiency of any photo lab depends largely on the attributes of the technician **and his equipment.** Unlike the man, the equipment must have it's qualities built in right from the start. Depicted here are four such units of processing equipment . . . . **all** possessing the quality factors that are so vital to "clockwork" efficiency in the darkroom and so typical of FISHER engineering.

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MINI-RAPID PROCESSOR DEVELOPS DATA DISPLAY FILM RECORDS–FAST!

See your data display film records in minutes. Fairchild Mini-Rapid Film Processors give you automatic delivery of negatives — developed, fixed, washed, dried—commercial quality.

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MINI-RAPID FEATURES

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INDUSTRIAL PRODUCTS DIVISION
FAIRCHILD
CAMERA AND INSTRUMENT CORPORATION

Get more information. Circle 419, page 69

LETTERS

To the Editor:

Discussion of newspaper microfilming by my good friend Vernon Tate in his column on Microreproduction (PMI, *February 1961*) brings up a couple of points which should be mentioned lest they be misunderstood by those not familiar with the field. . . .

Since we offer both [microfilm and bound file] services and have contacts with these users, we have been able to explore the details and we find that bound files are preferred for immediate use and are maintained for a period of from one to ten years and then destroyed or in some cases given to a local library or historical society. In other cases where plenty of storage space is available, bound files are kept and used but in the majority of cases, the dating out procedure is followed.

The second point is the relative cost of the two systems. It is true that it is cheaper to make a positive print than to bind a file but in the majority of cases, negative production is also involved and this raises the film costs considerably above that of a positive print only. Also involved is the quality of the bound file used for a price comparison. Flat rate files are inclined to be lower in price than custom built files and therefore closer to the cost of microfilm. Custom quality files which include correction of various press inflicted defects have a tendency to be considerably higher in price, yet in some cases, depending upon the number of pages in the volume, the price of film runs higher than bound files.

We believe that this same line of reasoning, that originals have their place as well as microfilm copies probably holds true in fields other than that involving newspapers. The important thing is for the user to be familiar enough with the application of both microfilm and the original to make an intelligent choice and application of the proper system to the problem at hand.

Bob Forman
The Forman Co.
Monmouth, Ill.

PMI DIRECTORY

Coming in October. Get a free copy with your subscription to PMI. See subscription order on page 69.

Ever get a dot this perfect?

You might . . . with carefully controlled conditions and a lot of special techniques. By using Liquid Engrav-O-Lith® Developer, you will come very close to this ideal dot—closer than with any other developer. And you'll get truly exceptional density and contrast with the new type emulsions.

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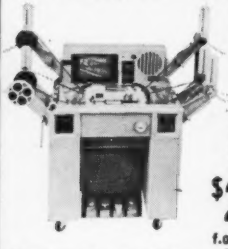
ACMADE MARK II
EDITING TABLE



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Operation of this simple, efficient editing machine can be mastered in minutes. Continuous movement provides absolute safety for your film. Instant controls and declutching allows up to 50% increase speed and efficiency in editing. Any combination of 2 or 3, 16mm or 35mm channels, plus magnetic and optical sound available.

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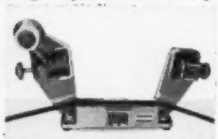

The first practical, speedy and efficient automatic splicer and perforated adhesive tape (Magic Mylar) applicator on the market. Now, with no fuss, mess or waste, it is possible to splice, repair, butt-splice, or strengthen splices on all types of film — positive, negative, magnetic — even duPont Cronar or other bases.

The cutting arm, shown in operating position, is used by pressing the chrome button for cutting both sides of the film simultaneously. The film, of course, has been registered on pins in the horizontal channel. The cutting blade is easily replaced when necessary.

The splicing tape is registered on precision pins and held in place until automatically applied to the film by swinging the arm over and pressing the chromed button. This action simultaneously cuts the adhesive and applied it — in perfect register to the film.

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Get more information. Circle 422, page 69

ASHTON ON TECHNIQUES

Developer-in-the-paper process: a revolution in photo printing?

In the last two years a new and rather interesting method of photocopying for office use has been quietly and without a great deal of fuss moving into the European market. One of the companies responsible for the introduction of this system foresaw that the idea could also be used to print normal picture negatives as distinct from high contrast line originals such as generally are considered desirable in photocopying. But at that stage the idea made no great amount of headway, although it was used to a limited extent where quick proof prints were required, in newspaper work for example.

Now, suddenly, the idea has caught on and a number of European manufacturers of sensitive materials are offering a range of matte and glossy surface papers in both high and normal contrast ranges and spanning a wide choice of emulsion speeds. This could well be the beginning of a revolution in print-making methods and lead to the darkroom, for the making of paper prints at least, becoming obsolete.

In from left field

Since the beginnings of this system do not seem to be particularly well documented, and indeed it does not yet seem to have been blessed with a really descriptive name, it would appear a timely move to place on record some details of how these materials and their associated processors work.

The dryprint process, as it appears to have been named by common consent, was probably the outcome of the very great popularity of the silver diffusion-transfer photocopying system. Smaller manufacturers of photocopying materials in Europe looked around for a system which could offer the extremely simple and rapid processing of the silver diffusion system but which was not covered by the silver diffusion patents. This aim was successfully achieved and there are at the present time no less than five manufacturers of dryprint paper in Europe and a much larger number of manufacturers of processing machines.

How the system works

The system is essentially one of great simplicity, based on well-known photographic processes with just the little extra twist which makes the inquirer wonder why nobody thought of it before.

The paper used is in most respects a perfectly normal photographic material coated with a silver halide emulsion; the single difference between the material and normal development papers is that the dry-print paper has, in addition, a development agent incorporated at the time of coating. The usual developing agent used is, in fact, hydroquinone. This simple variation is the key to the whole process and when linked to a suitable processing sequence the whole thing becomes a very practical and workable system.

Taking a leaf out of the silver diffusion worker's book, compact processing machines have been devised in which the paper simply needs to be fed into a slot at the front and is delivered, processed, from a second slot. The solutions are applied to the emulsion side of the paper only by a power-driven roller applicator and since only a very small quantity of solution is applied the paper dries very rapidly. Two solutions are, in fact, applied to the emulsion surface of the paper in turn, first a highly alkaline activator which in combination with the developing agent in the emulsion layer, rapidly develops the exposed silver halide of the emulsion in the orthodox fashion. The stabilizer which is applied immediately after the activator is, again, fairly orthodox

(continued on page 16)

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Photocopy Paper

GRANSTAT 105
A "workhorse" standard weight document paper. Semi-matte finish.

NEW GRANSTAT 55
Offers the same benefits as the "105", but on an extra thin ledger, 100% rag paper. Semi-matte finish.

CONTRAST...Dense blacks and brilliant whites for better appearance, legibility, and quality, and for more customer satisfaction.

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Gentle, safe, thorough . . . and so economical to operate

Handles all sizes up to, and including 20" x 24"

Speedy, durable, compact . . . easy to load, easy to unload! Prints come out clear and clean because the Calumet washing action keeps them separated and in constant motion. As the inner sink rocks gently, a motor-generated wave of water moves from one side to the other. The water moves upward, too, thru a perforated false bottom within the inner sink. Your prints are lifted free in the actively moving water, each apart from the others. It uses SMALL amounts of water, changing it continuously. And it speeds washing decidedly.

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- **Saves time . . . saves water**

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Manufacturers of Cameras, Photographic Processing, Studio and Laboratory Equipment

Get more information. Circle 412, page 69

in its composition consisting generally of an ammonium thiocyanate solution made suitably acid to neutralize the highly alkaline activator.

Document applications

When the dryprint process is used for photocopying, the exposure is made by placing the document to be copied in contact with a sheet of the sensitive paper and exposing it reflex-fashion, that is with the back of the paper nearest to the light source, in a contact printer. The paper is then processed in the processor and gives a negative. A positive print is then made from this negative on a second sheet of the same paper as was used for the negative exposing it by contact and running it through the processor. Thus, compared to the silver diffusion system, the dryprint process is a two-step process and it is an essential feature that the processor shall deliver an almost dry negative so that a print can be made quickly. On the other hand, the fact that a negative has to be made can be an asset in that it can be filed and used for further prints at any time.

Finally, and to get back to the original point, the fact that the dryprint process in a negative-positive system means that as soon as a normal contrast paper was conceived the way was open to a rapid and simple method of printing standard picture negatives.

Photo printing

Currently the dryprint process is being used in two ways for printing picture negatives. On the one hand, there is the strictly amateur exposing and processing unit typified by the Rollaprint outfit made in France by Bauchet and marketed by U.S. Photo Supply Co., Inc., in the U.S. The professional photographer is catered to by units typified by the Fotorite marketed by Geiss-America which will, at the present time, handle and give excellent quality prints on paper up to 8 x 10 in. and later in sizes up to 11 x 14 in. By a nice balance of speed, dryprint papers can be used for contact printing in low-level room lighting but faster papers, comparable in speed with normal enlarging papers, can be used for projection printing.

In Europe, in addition to the

(continued on page 20)

If your camera...

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give you critical ground glass focusing and composing—direct, accurate, and full size.

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capable of lens tilts, swings, and shifts for controlling distortion—plus bellows extension for 1:1 copying.

won't

accept the complete choice of sheet, roll, pack, plate and all Polaroid emulsions.

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Get the camera that does...a GRAPHIC*

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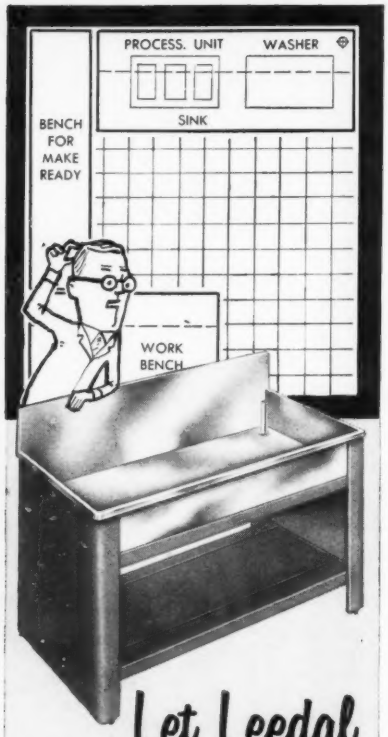

Let Leedal Help You Plan a More Efficient Darkroom!

Efficient darkroom planning will save processing time and speed production. Leedal's catalog (see coupon below) has a complete section devoted to layouts for typical film and print rooms with suggestions for painting, plumbing, ventilating and wiring. If yours is a special problem, we'll help you solve it quickly. After the darkroom is planned, fill it with Leedal Stainless Steel equipment.

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It's your best buy for a permanent installation. Leedal makes a complete line for black and white and color processing.

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Get more information. Circle 440, page 69

Edward R. Farber

ELECTRONIC FLASH

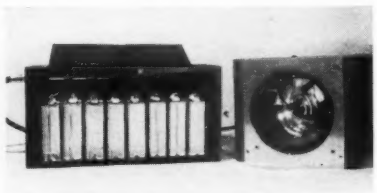
Advances on the high-speed front: square wave flash, a guided spark

Three scientists—Lemuel L. Hill, Theodore Marshall, and Benjamin J. Crapo, of the Gas Dynamics Division, Naval Ordinance Laboratory Ballistics Department—have designed a self-shuttering electronic flash of high intensity that puts out a square wave pulse of light. That is, it puts out a pulse of light of uniform intensity for a definite period of time, as contrasted with the peaked wave shape with which we are accustomed with most types of flash.

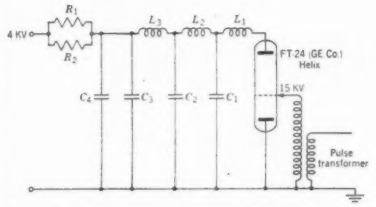
Such a light source is invaluable in connection with continuous writing or drum cameras where a number of pictures are exposed during the flash and it is, of course, desired to have the negatives of equal density throughout. The flash must last for a definite period to avoid exposing the film again on the second time around, since mechanical capping is impractical.

Shaping the pulse is accomplished by means of a so-called artificial transmission line, which is a network of resistance, inductance and capacitance which can store up energy and deliver it at a certain rate. In this case, the duration is .003 sec. The row of capacitors can be seen in the photo of the unit. Not clearly seen are the inductances or "chokes" which are wound on an insulating tube, each one immediately above its respective capacitor. For those who are interested in further information on the subject, we suggest the article by William C. Griffin, U.S. Naval Ordinance Test Station, China Lake, Calif., which appeared in the March 1957, Journal of the SMPTE.

All of which reminds us that in the March 1961 issue of the above named journal are two articles of interest. One is a highly technical report on the Physical and Technical Parameters of Flashtubes by two Russians of the Laboratory of Flashlight Sources at the Electric Lamp Works, Radiotechnical Industry, Moscow.



Transmission line and light source



Circuit of square-wave flash: R1 R2, 1000 ohms, 200 w; Cl, 80 microfarads, 4 kv, GE No. 14F204; C2 C3 C4, 100 microfarads, 4 kv, GE No. 14F311; L1, 0.90 mh, No. 10 WG; L2, 1.22 mh, No. 10 WG; L3 1.58 mh, No. 11 WG. Helical flashtube is drawn straight for the purpose of simplicity.

Guided spark

The other is a somewhat more practical, though scholarly, article by Harold Edgerton, John Tredwell, and Kenneth W. Cooper, Jr. of M.I.T., on "Submicrosecond Flash Sources." The "guided spark" flashtube is described. The arc is guided on the outside of a 7mm OD Pyrex glass tube. The electrodes are about an inch apart in air and in contact with the glass tube to facilitate starting. Starting is initiated by a spark coil pulse applied to the *inside* of the glass tube. The arc itself is in air: the afterglow is short and of a red color. The lamp is energized by .05 microfarad charged to 18,000 volts —about 8 wattseconds, which gives a duration of 0.4 microsec. Every effort is made to make all leads

(continued on page 20)

INSPIRED SERIES!

The superb lenses illustrated below might never have been produced . . . had there not been a **Linhof** to inspire a **Zeiss!** It was indeed at the behest of the world-famous Linhof Camera Works that West Germany's Carl Zeiss designed these truly extraordinary lenses. In the rigid conditions set forth by Linhof, cost of development was no factor. The lenses had to be the finest obtainable . . . their basic characteristics were to be **unsurpassed image quality, ample speed for poor light, and excellent definition at all apertures.** Result . . . the incomparable Linhof series of Carl Zeiss lenses!

Though created specifically for Linhof Super Technika cameras, these superb optics enhance the capabilities of other makes of 4x5 and 2¼x3¼ cameras as well. No matter what your choice of camera or your field of endeavor—advertising, technical illustration, portraiture, architecture, pictorials, news, or fashion—try one of these Zeiss lenses on your next assignment. Your investment will reward you for a lifetime! **Available only through your franchised Linhof dealer.**

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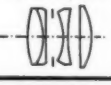
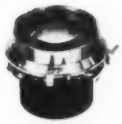
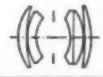
TESSAR
f/3.5 105mm (for 2¼x3¼)
f/4.5 150mm (for 4x5)
Synchro-Compur shutter,
1 sec. to 1/400th



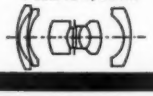


PLANAR
f/2.8 100mm (for 2¼x3¼)
Synchro-Compur shutter,
1 sec. to 1/400th

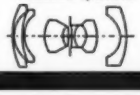
PLANAR
f/3.5 135mm (for 4x5)
Synchro-Compur shutter,
1 sec. to 1/400th



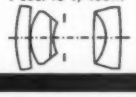
BIOGON
f/4.5 53mm (for 2¼x3¼)
Synchro-Compur shutter,
1 sec. to 1/500th



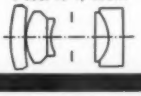
BIOGON
f/4.5 75mm (for 4x5)
Synchro-Compur shutter,
1 sec. to 1/500th



SONNAR
f/4.8 180mm (for 2¼x3¼)
Synchro-Compur shutter,
1 sec. to 1/400th



SONNAR
f/5.6 250mm (for 4x5)
Synchro-Compur shutter,
1 sec. to 1/400th



Objective	Largest Aperture	Focal Length mm	Useful Diameter of Circle in mm	Maximum displacement of the objective for horizontal format* Vertical ± mm	Horizontal ± mm
2¼x3¼ in.					
PLANAR	f/2.8	100	120	12	9
TESSAR	f/3.5	105	120	12	9
SONNAR	f/4.8	180	140	26	20
BIOGON	f/4.5	53	115	9	6
4x5 in.					
PLANAR	f/3.5	135	170	13	10
TESSAR	f/4.5	150	165	9	7
SONNAR	f/5.6	250	185	22	19
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*For vertical format, interchange the values.

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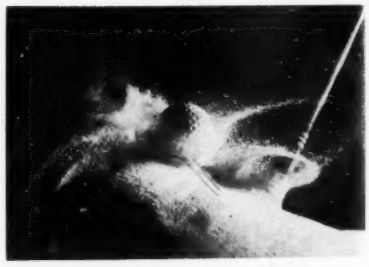
ELECTRONIC FLASH

(continued from page 18)

very short and direct to maintain the short duration.

Since the arc is noisy, the flash tube assembly described is inserted in a glass envelope and further sealed with a rubber cork. Using a polished reflector, an aperture of f/8 was found suitable with Panatomic X film at a distance of 3 ft.

The new unit was recently used to make some sand trap pictures to advertise Acushnet golf balls as seen in this ethereal shot by Edgerton, Tredwell, and John J. Guenette. Triggering was done by two wires embedded in sand in front of ball that made contact when hit by ball.—THE END



Ethereal golf ball at .003 sec.

ASHTON ON TECHNIQUES

(continued from page 16)

use of these novel materials for amateur contact printing and professional proof printing where speed is important, another use is rapidly gaining popularity among photodealers. With a dryprint processor on his counter the photodealer can, in a matter of 10 or 15 seconds, show his customer a print of any negative; and bigger machines designed for laboratory use could revolutionize photofinishing techniques. Such machines are already in being and offer the photodealer a photofinishing laboratory in one modest size room behind his shop premises, without need for running water or gallons of solutions.

The dryprint process has plenty of potential and it will be interesting to watch its progress in the next few years.—GEORGE ASHTON

69

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Arnold Eagle

INDUSTRIAL MOTION PICTURES

More on the foot-candle method for cine exposure: movie meters

Col. Edward Steichen told me a story many years ago, which I'm always reminded of in any discussion of exposure meters. Accompanied by a young photographer who had a miniature camera hanging around his neck, he went to visit a real old-time portrait photographer who was a great master. Steichen described the old-fashioned studio, dominated by an 11 x 14 camera which had a lens cap on the lens for a shutter. The only source of light was an overhead skylight. The young man was very impressed with the beautiful quality of the portrait prints obtained by this old man. He asked, "What kind of exposure meter do you use?" "Exposure meter!" exclaimed the old craftsman. "I never had an exposure meter. I always count three." The young man was amazed. "How is that possible, when you use only daylight, which is constantly changing? What do you do when it is cloudy, for instance?" "That makes no difference," replied the old man. "I still count three. Only, when it is sunny, I feel happy, so I count quickly, one-two-three. But when it is cloudy, I feel sad; when I lift the lens cap, I count slowly, one——two——three——. But it is always three. No meter could substitute for what this man had, judgment stemming from long experience with his tools, lighting, materials.

Lighting to the point

In my last column I spoke of the practice of lighting a scene to a pre-determined foot candle level, as contrasted to the traditional method, which consists of lighting a scene, and then taking a light reading, setting the lens stop according to the film speed. The latter is the procedure in still photographic shooting which has the advantage over movie camera exposure in that the exposure time can be changed to accommodate the depth of field requirement and the amount of light available. In movie photography, on the other hand, the exposure time is usually constant, 1/50 sec. at 24 frames per sec. Normally, the only adjustment the cameraman can make to get a correct exposure is to change the "f" stop on his lens. As I mentioned in my last column, this has a disadvantage. It may prevent the cameraman from using his lens at its most efficient stop, where the greatest lens resolution can be obtained. This is one compelling reason for lighting a motion picture set to a pre-determined foot candle level.

There are others. For example especially in color shooting, and with black-and-white film to be used for television, a low contrast ratio is desired. In this type of lighting, it is most practical to start with the "fill in" lighting, build it up to ½ stop or one full stop below the necessary foot candle level. Then key lights may be set up to highlight the subject, thus bringing up the lighting to the pre-determined light level. This type of lighting is a big help in the editing stage, when matching up the tonal quality of the various cuts of different shots.

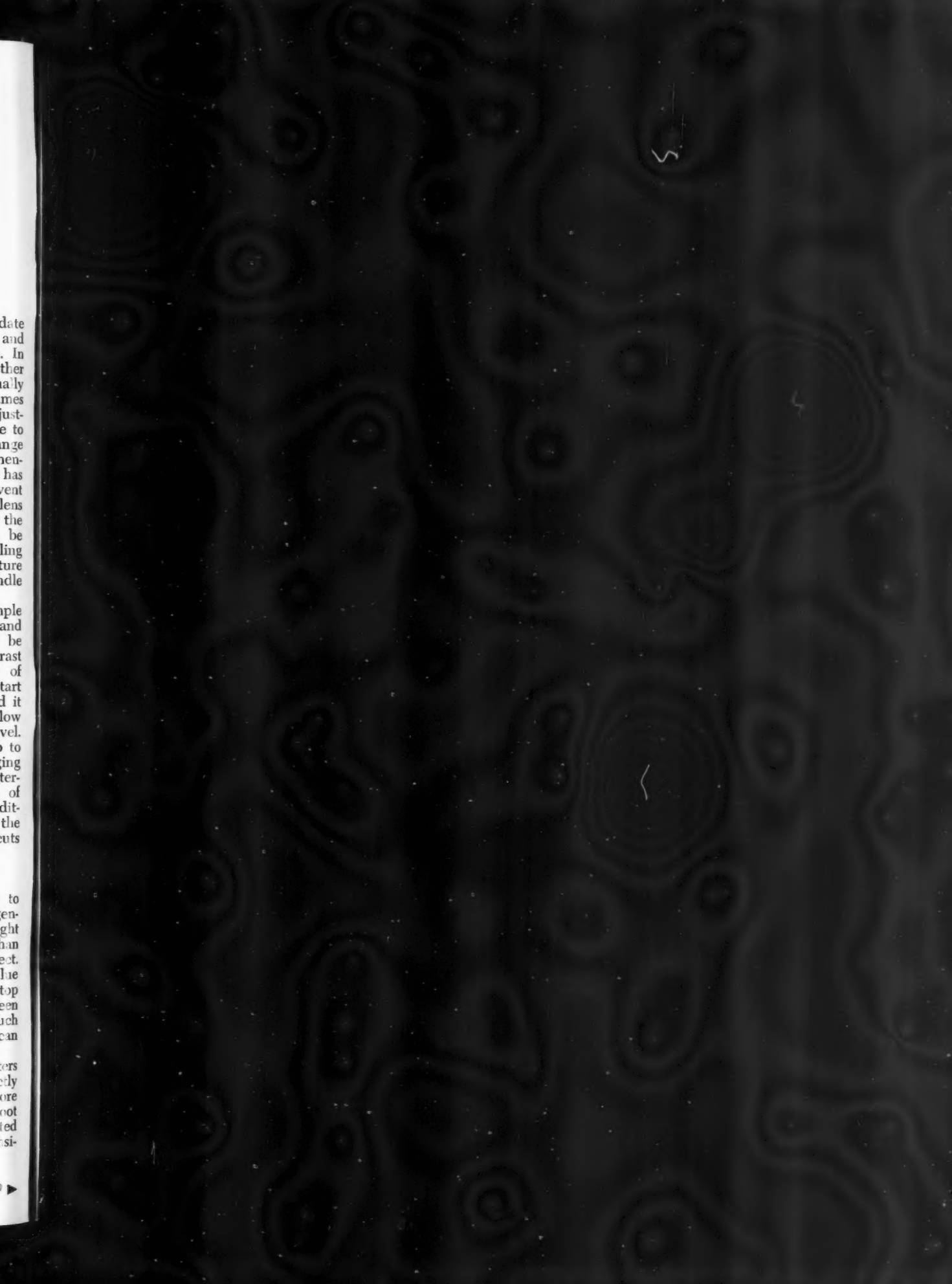
Incident vs. reflected

In building up the lighting to a pre-determined level, the general practice is to read the light falling on the subject rather than the light reflected from the subject. Often only the foot candle value is read, its interpretation in f-stop and shutter speed having been read in advance from tables such as those published in the American Cinematographer's Manual.

There are a number of meters which read incident light directly in foot candles. One of the more recent is the Gossen Tri-Lux Foot Candle Meter, Model C, imported by Kling Photo Corp. It has a sensi-

(continued on page 52)

Get more information. Circle 476, page 69 ▶



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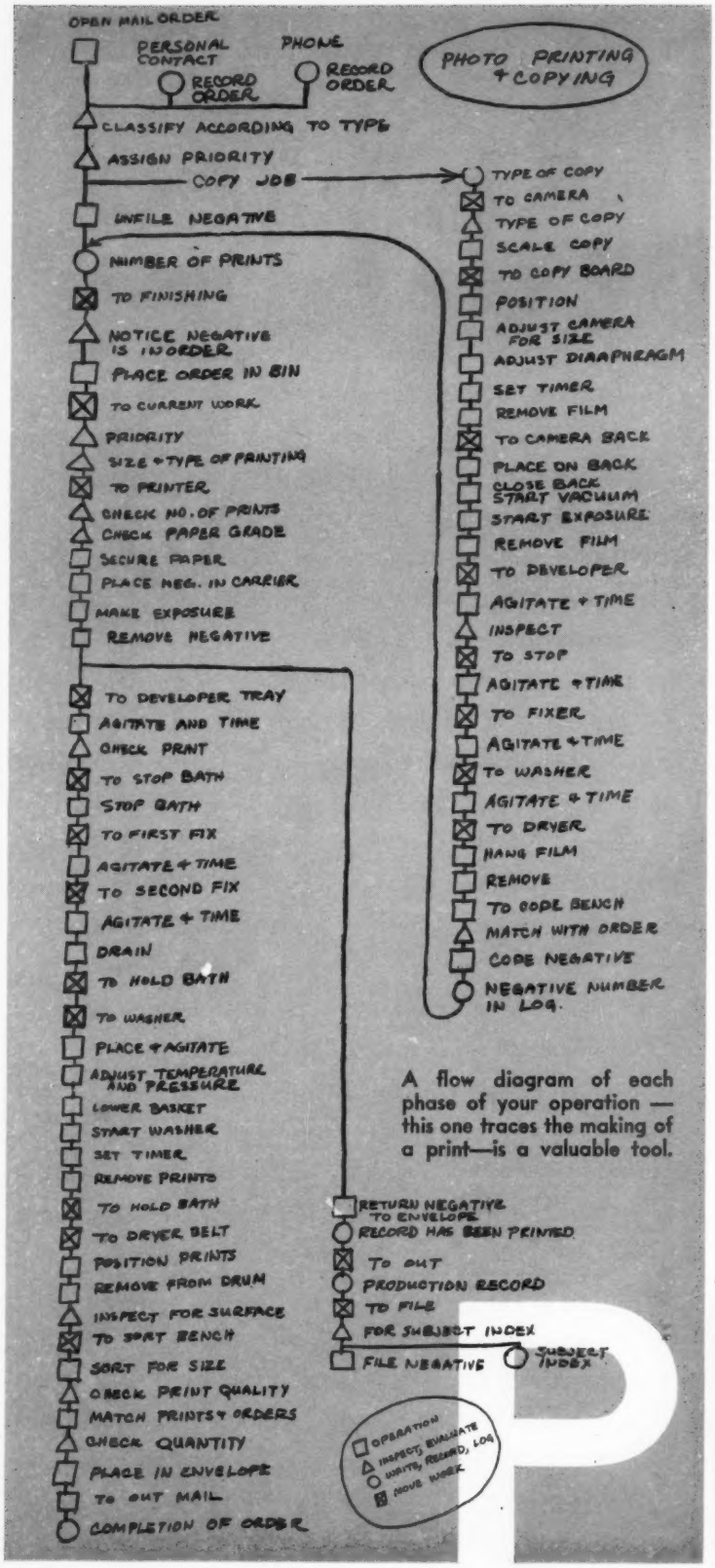
AN EDITORIAL

Facilities

Industry has a high regard for tools. Through long experience it has learned that inadequate machines and workspace are costly because they waste the most important, and the most expensive, factor in producing just about anything: human effort. While industry may skimp on salaries or staff for the photographic department, it likely provides at least the basic tools and space to do the job. ■ Are the facilities for in-company photographers, then, what they should be? They are not. And, paradoxically, they seem to fall short most often where the department is most valuable to the company. The explanation is not too difficult. When a department is doing a good job, and when the company is aware of the value of the services offered, the demand soon outstrips the capacity of the facilities. This is the bind that the typical in-company photographic department finds itself in. The only way out that we see is for the photographic department to plan for expansion, to try to build in to their facilities as much flexibility as possible. This failing, the department must impress on management whatever inadequacies exist. Inertia, rather than perversity, is usually the main problem here. ■ Besides flexibility, where else do industrial photographic facilities fall short of the mark? In some cases they are badly located, adjacent to shops abounding with soot, fumes and vibration, bitter enemies of excellent work. Or they may be too distant from the main arena. Occasionally they are too diversified, with too many darkrooms duplicating one another. In other cases they are not diversified enough: where facilities are needed, they don't exist, severely hampering service. More often, auxiliary space is neglected: file space, separate chemical mixing rooms, a counter where work can be delivered without the department's routine being disrupted by visitors. Traffic patterns in general are often neglected. ■ Photographers have a duty to themselves and their organizations to save their efforts for the battle in providing service, and not squander them in battling inadequate facilities.

The Editors



A flow diagram of each phase of your operation — this one traces the making of a print—is a valuable tool.

In the opening sequence of *The Naked Eye,* a motion picture about some of the great photographers of our time, the camera dollies in on a dingy little room near Times Square. In the foreground is a large bed, obviously slept in, because Weegee is sleeping in it. Weegee rises to the alarm, and while he is stuffing his shirttail into his pants (with the shirttail out they serve as pajamas), the voice over action explains that this is his combination bedroom, living room, kitchen, darkroom and studio.

This constituted all the facilities necessary for some formidable photographic work. While it is hard to imagine anyone else working successfully under such conditions, Weegee seemed rather proud of them. Plainly, there were some advantages. Weegee could get to a fire fast, and get back to bed quickly when he'd finished a job. Besides, the rent was low.

Weegee's quarters serve to point out that the ideal form and content of photographic facilities are different for every kind of photographic work. His are diametrically opposite to what is needed for in-company facilities.

What is right for in-company photography? Nobody can answer that question honestly, it depends entirely on you. What we'd like to do instead is to suggest a method for coming closer to the ideal when planning photographic facilities.

The method could be called the *Sesame* approach. It's nothing new, simply an adaptation of the system used by modern industry for planning any kind of production facility. The letters in Sesame stand for: *Survey* your present and past work load. *Estimate* your future work load. *Study* all the possible ways of meeting the demand you will have to meet, and select the one most suitable for you. *Analyze* the procedure in this ideal method. *Map*

PLA

FACILITIES are rar ly b

out your work flow. *Evolve* your plan to fit this flow of work.

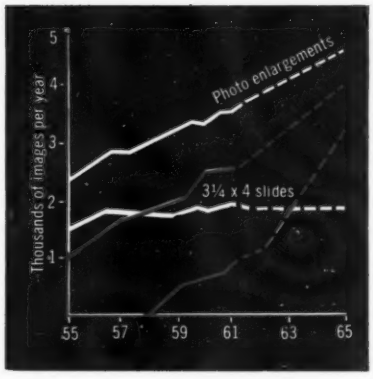
Actually, we suspect, this is precisely the opposite of the method used in planning most photographic facilities. In most cases in the real world the *Emases* method is in effect. The plan is executed first and its shortcomings turn up later long after the plumbing is in and the equipment guarantees have expired.

The Sesame system, on the other hand, assumes that the only purpose of an in-company photographic facility is to help photographers do the jobs they are called upon to do—with the least amount of toil and turmoil.

Open Sesame

The first step, surveying your present and past work load, is hardly a step at all. Except in one and two-man departments, a good number of in-organization photo staffs do keep careful records of the types and amount of work they handle. Even if such records have not been kept, there is a method of analyzing what your demands are now and what they have been in the past: your purchasing records. If it turns out that you bought a 50-sheet box of contact paper per week, on the average, in 1957, and you're buying two 500-sheet boxes currently, you have a pretty fair idea of what's happening to your contact print business. If you can carry this out for enlargements, color transparencies, color prints, motion picture footage, art services, graphic arts negatives, copies, black-and-white film in the various sizes you employ, and such specialized services as identification pictures, photomicrographs, sound slide films, exhibition murals, you'll end up with a nice picture of what's going on.

This information can give you a rough idea of what's going to happen in the future, and this is invaluable in planning. A growth chart (*above*) shows how to project your data. Operating on the assumption that the trend in the past will continue in the future the dotted lines are extended into the forthcoming years. In this case they indicate that everything's going up except lantern slides. Now, any kind of extrapolation has to be taken with a grain of salt. For example, the hypothetical department head behind the hypothetical chart shown here may know, sure as shooting, that the future will not bring what the dotted lines indicate. The company may presently be going out of business. Or, more plausibly, the firm may have decided to decentralize office copying, putting a machine on every desk—and that by the middle of the next year a new 1000-seat auditorium will be completed, calling for lots of lantern slides. His best guess then is that the copying will level off and the lantern slide business zoom. However, the facts and judgment combined will give a ball park figure for the demand to be expected in two, three, four or more years hence.



One of these, we submit, should be the basis for planning an in-company photographic facility. How far into the future you plan depends on how fast you're growing, how fluid your company's operations tend to be and how conservative you and your management are. In any case, there is nothing conserved by planning facilities to serve the needs of the present—it will soon be gone. Not counting on the volume of the future is one of the commonest traps in-company photo departments back into.

Ask questions

Assume that a fair estimate of future demands has been arrived upon. The next step is to study those demands, and the methods for meeting them. This is deceptively simple. Company A's photo lab turns out about 1000 prints a week. Company B handles about 1100. But it turns out that Company A uses those prints for news releases that get their best play after a quiet Sunday. The PR department picks its pictures Friday afternoon. That means that between 2 and 5 on Friday, Company A's photographers have to handle something like 350 prints per hour. Company B, on the other hand, is a methodically organized research outfit. The pictures go into reports and orders have to be completed within a leisurely two weeks. That means Company B has to turn out about 220 prints per day or about 30 per hour, a far cry from Company A's hourly output. The two outfits have to frame their thinking very differently.

Once a reasonable estimate of daily or hourly peak production has been arrived at, it is time to forget what an expert photographic technician you are and ask yourself some simple-minded questions. For example, what is the most efficient way to produce 40 (or whatever it is) 8 x 10 glossy prints per hour from five 4 x 5 negatives? Most

(continued on following page)

NNING

better than the thinking behind them: a plan for logical planning

photographers are likely to reply that the way they're doing it is the most efficient way. But it ain't necessarily so. In some companies a photographer has to keep hopping just to dry 40 prints per hour—on equipment that was designed for amateurs. To get a real picture of efficiency—your efficiency—its best to start out by finding out how many man-hours go into making 40 prints, or 40 copies, or what have you. If it turns out on a day-in, day-out average to be one-man-hour, and if there is nothing else to do with one man's time after all the prints are sent to the customers, you can stop looking. Any more efficiency and you'll have to figure out a hobby to fill up your spare time.

There are techniques for increasing the efficiency of any process. Space does not permit going into them here, but they can be found in any text on work simplification. Among other things, they consist of turning as much of the work as possible over to machines, cutting out unnecessary steps, avoiding delays and backtracking, having fixtures to hold things, dividing up the work equitably between both hands and amongst all the crew, keeping the flow of work as steady as possible.

In photography, fortunately, a lot of this study and thinking has already been done. There are mechanized driers, print trimmers, print straighteners, agitating devices, chemical wash accelerators, automatic slide mounters. Almost every area of photography has been automated to some extent. In some fields of photographic processing, these devices have gained wide acceptance. Motion picture processing, photo finishing, microfilm production, document reproduction, volume printing, have been quite automated. It is worthwhile studying the methods employed in these fields; they may apply to you.

Probably the most useful model to observe is one with quantity and quality demands similar to your own. Some of these have been reported in PMI. Industrial photographic associations are, of course, organized so that photographers can compare notes and methods, and come up with superior ways for dealing with their problems.

Still another source of answers lies in the technical representatives of photographic manufacturers. Some, we'll wager, are brimming with answers for you to tap. In any case they are famed for being well-informed and cooperative.

Finally, the resources within most large organizations should not be neglected. Industrial engineers and architects are professionally trained planners. If they don't have the time to deal with specifics, at least they can be helpful with general approaches and criticism.

Analysis

Before you pin down your proposals you should take a long second look at them. Here are some questions to test them with.

Have I a realistic idea of the quantity of work that can be produced per man hour with this system, at the quality level I wish to maintain? Someone has estimated that a fair production with a motorized machine is about half of its top rated output, considering the variety of work put into it and inevitable delays and interruptions. You want to know what happens under actual working conditions.

Have I considered other possible alternatives for the products this will produce? With the availability of high intensity tube lamps developed for diazo printing, a number of in-company units have turned to rotary POP exposing devices for making proofs. This not only cuts out wet processing, it helps urge clients to return the proofs for permanent prints and is an automatic file cleaner-outer.

Have I neglected any means for motorizing the coolie parts of the job? A photographer or darkroom technician should be a valuable person, he should be paid for his skill and thinking, rather than for being a robot.

Have I given due consideration to the use of outside services: studio and sound-stage rental, volume print processing, color finishing, motion picture and microfilm processing, copying, presswork, etc.? Outside service organizations may be equipped to supply needs at a considerable savings in cost and fuss, or, by absorbing peak load work, they may make your facilities go a lot further.

Have I realistically, objectively, considered all the alternative methods for getting to my goal? This is the toughest of them all.

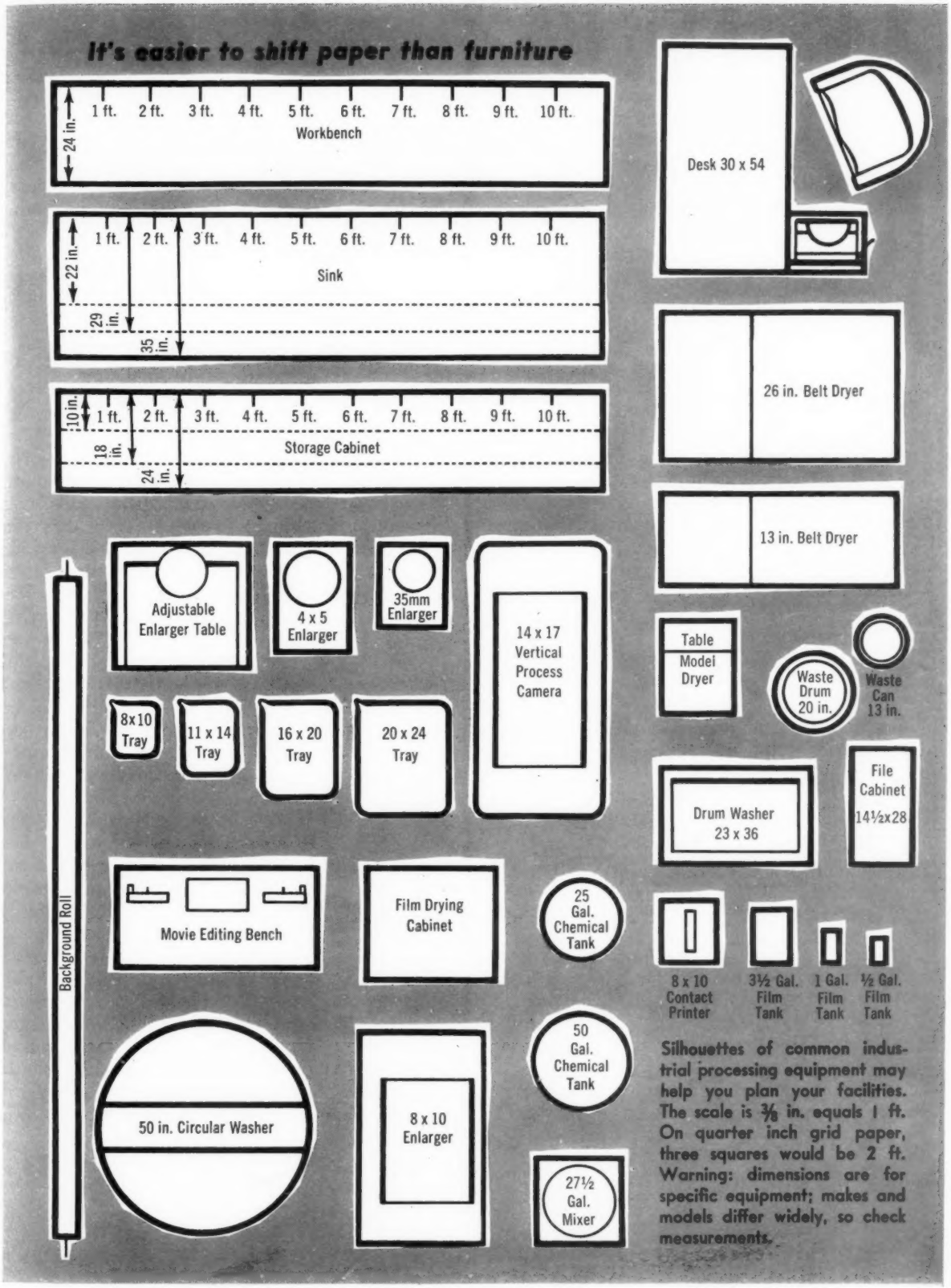
Once you have come up with a practical method for handling your production, if it involves extensive revisions in the present plan, and if yours is like most in-company units, you'll have to fight to effect the new plan. This means you have to get management to approve any expenditures for equipment and additional space necessary. However, the Sesame method should provide you with some ammunition for the fight. You should have the facts to back up your estimate of the future work load. You should have a clear statement of the problems which the company is calling upon you to solve. Furthermore, you should have a plan of action for solving these problems, with facts, figures and case studies to justify your choices by showing how they will save money or improve service.

The map

Whether you gain approval for all of your ideas or just some of them, the next step is to analyze the work flow in the method you will employ. The diagram at the beginning of this article illustrates a highly useful tool for such an analysis. Specifically, it is an adaptation of a work flow chart used at Procter and Gamble and presented in a talk on darkroom planning by R. A. Heeb at the 1960 National Industrial Conference of the Professional Photographers of America. It uses work simplification symbols to classify the steps involved in continuous tone printing. One branch of the diagram is devoted to making copy negatives from prints or transparencies where no negative is available, or from artwork. It is a very simple way to guide your thinking for efficient utilization of space and equipment.

Any set of symbols could be used, this is just an example, but a good one. A box with a cross in it indicates where work must be moved. These boxes stand out from the rest for a good reason. They are the main targets in arranging your facilities. Generally, the most efficient plan arranges work areas so that the distance work must traverse is reduced to the barest minimum. Ideally, in moving work you should not have to take a step. If it is necessary to do some walking it should be done during a portion of the process where a lot of work can be moved in one operation, e.g. in bringing the morning's stack of negatives into the printing room—or where a waiting period is involved, such as when film is drying. In cyclical work, the end of the

(continued on page 60)


It's easier to shift paper than furniture
24 in.
1 ft. 2 ft. 3 ft. 4 ft. 5 ft. 6 ft. 7 ft. 8 ft. 9 ft. 10 ft.
Workbench
22 in.
29 in.
35 in.
Sink
10 in.
18 in.
24 in.
Storage Cabinet
Desk 30 x 54
26 in. Belt Dryer
13 in. Belt Dryer
Table
Model
Dryer
Waste Drum 20 in.
Waste Can 13 in.
Adjustable Enlarger Table
4 x 5 Enlarger
35mm Enlarger
14 x 17 Vertical Process Camera
8x10 Tray
11 x 14 Tray
16 x 20 Tray
20 x 24 Tray
Drum Washer 23 x 36
File Cabinet 14½x28
Background Roll
Movie Editing Bench
Film Drying Cabinet
25 Gal. Chemical Tank
8 x 10 Contact Printer
3½ Gal. Film Tank
1 Gal. Film Tank
½ Gal. Film Tank
50 in. Circular Washer
8 x 10 Enlarger
50 Gal. Chemical Tank
27½ Gal. Mixer
Silhouettes of common industrial processing equipment may help you plan your facilities. The scale is ⅜ in. equals 1 ft. On quarter inch grid paper, three squares would be 2 ft. Warning: dimensions are for specific equipment; makes and models differ widely, so check measurements.

LIGHTING

All full-fledged photographers learn from *pure experience*—to one degree or another—how to "judge" a black-and-white print during its development under darkroom safelight conditions so that the final print has the desired density level and contrast when examined outside the darkroom in bright light. This is not an ability fully acquired overnight. In fact, some photographers, never become really expert at it and they have to depend either upon an unnecessary number of trial prints, or a good "darkroom man," to produce prints of high quality.

Perhaps this is the simplest and most effective example to point up the fact that the *evaluating* lighting conditions must correspond as closely as possible to the *display* lighting conditions if a photographer's results are to meet his client's expectations, as well as satisfy his own quality standards. This applies to all types of pictorial photographic end-products – black-and-white or color prints, color transparencies, etc., whether small or gigantic murals.

Lloyd Varden

Is it proper for the photographer to take the position that his assignment ends once he has produced a result which his client accepts under the lighting and surrounding conditions it is shown to him? Or should the photographer assume full responsibility of acceptance right up to the finally displayed result?

Neither of these questions would be answered "Yes" or "No" by *all* photographers. The most frequent answer probably would be, "It all depends." And this seems to be the most sensible answer, considering the number of issues and problems involved.

Mr. B. M. Murphy ("Lighting Colour Prints and Transparencies for Display," *The British Journal of Photography*, February 17, 1961, page 78) summates succinctly, and indeed quite kindly, what should be done in the future in view of what often happens today. He states the following in the introductory paragraph of his article: "Rarely has it been so (*continued on page 62*)

DUST & DIRT

Dust is a subject which has been photographe l, albeit inadvertently, probably more than ai y other in the world. Industrial photographers, e pecially, are plagued by it, for many of the n work in areas and atmospheres where particles of dirt, chemicals, lubricants, abrasives, and oth r "crud" are constantly floating in the air, and f not causing silicosis because of inhalation, ofte n causing psychoses because of frustration in tryi g to avoid dust on the final print.

In making a study of dust control (or as co trolled as it can ever be in some industries) I find that there are three general areas of consideration: basic darkroom planning and physic l set-up, the ventilation and air circulation, and th e day to day disciplines which may help subdu e dust gremlins.

Presuming that you have some say or contr l over basic darkroom construction or modificatio , one of the first things to consider is the darkroo n and photo department floor. Too often the darkroom is given a bare concrete floor—after all, you are working with liquids—and this is about as horrible a creator of dust as you can have. If you have a concrete floor, cover it! A couple of coats of good paint will do for a start. Ralph Baum of Modernage says the best paints for this are marine type deck paints available from marine supply houses. This paint dries into a very hard traffic-resistant coating and can take good scrubbing without baring raw cement.

David B. Eisendrath, Jr.

Most modern labs use floor coverings of some sort like plastic or rubber matting, often with a spongy base to be easy on the feet. If they are smooth and with no crevices for dust, they are excellent.

The less under-counter space you have, the better, too. Wall mounted shelves or cabinets, and enclosed cupboard space underneath sinks or anything requiring legs will do much to eliminate dust traps, will make floors much easier to clean and thereby ensure better and more frequent cleaning, too. (*continued on page 63*)

ENVIRO

FACILITIES are not simply stainless steel and backdrops; just as vital fo

WEATHER

There are two main considerations in controlling the in-plant atmosphere. One is to achieve specific temperature and relative humidity levels required by the work being done. The other is to maintain uniform conditions, at some level, throughout the work areas at all times. When the nature of the work is extremely critical, both are required. A uniform atmosphere is conducive to maintaining optimum quality and rate of output.

Herbert P. Paschel

The advantages to be gained from a controlled and stabilized atmosphere are many, and all have to be considered with almost equal emphasis. Some of the points to be pondered by photographers are the following:

1) A stabilized atmosphere minimizes or eliminates most of the problems that arise from dimensional changes in films, papers and other materials subject to thermal and humidity expansion and contraction.

2) Chemical reactions in photographic and graphic arts processes are more reliable, uniform and repetitive in a controlled atmosphere.

3) Worker health, comfort and efficiency are enhanced in a properly controlled atmosphere.

4) Standardization, mechanization or automation of repetitive operations, if influenced by atmospheric factors, are obviously either troublesome or impossible under uncontrolled conditions.

Now let us see what this all means in terms of the average in-plant photographic and reproduction section. An exchange of moisture between the surrounding air and such materials as film and paper causes them to shrink or stretch. Temperature changes will induce expansion and contraction, not only in the foregoing materials, but in glass, metals, etc., as well. Thus, if you are involved in critical work such as maps, engineering drawings, phototemplates, multicolor printing, printed circuits, etc., where dimensions must be held to extremely close tolerances, you have no choice but to maintain specific and rigid atmospheric conditions. Even if the work isn't critical, a stabilized atmosphere (*continued on page 75*)

AGITATION

The most critical aspect of photographic processing, aside from the chemical composition and temperature of solutions, is agitation. The idea of agitation, of course, is to replace exhausted solution with fresh solution at the interface of emulsion and solution. This in turn affects the balance of used-up to fresh chemicals within the emulsion where the work goes on. Agitation is crucial at every step of processing from development to washing.

There are two types of agitation, manual and mechanical. The older of the two is manual, and the oldest manual method is tray agitation. Tray agitation, whether it consists of rocking a single sheet of material or continuously interleaving a number of sheets by bringing the bottom sheet to the top repeatedly, is still good. Gravity effects, resulting from chemicals flowing down the sensitized material, are practically eliminated because the material is horizontal. Flow effects, likewise, seldom appear because there is enough irregularity in the movement of solution that they cancel each other out. Furthermore, there is a point beyond which further agitation has little effect on the results. Tray agitation methods, for the most part, go beyond this point of diminishing returns: they result in nearly maximum agitation effects. Therefore, despite human irregularities, the results are apt to be quite consistent. Some authorities have made careful tests on this. They've found that a skilled man produces results that are as even throughout the film and as consistent from film to film with tray agitation, as any practical method. If two men work out a common technique by watching each other, they can match each other's results quite well day after day, according to these experts.

Samuel Lang

There are some disadvantages to manual tray agitation, however: It may be diffiult to hold temperature in tray processing. The worker must continue his exercises throughout the processing cycle. He is limited to the number of sheets of film or paper he can (*continued on page 78*)

ONMENT

vital for pictures and photographers alike are the physical working conditions

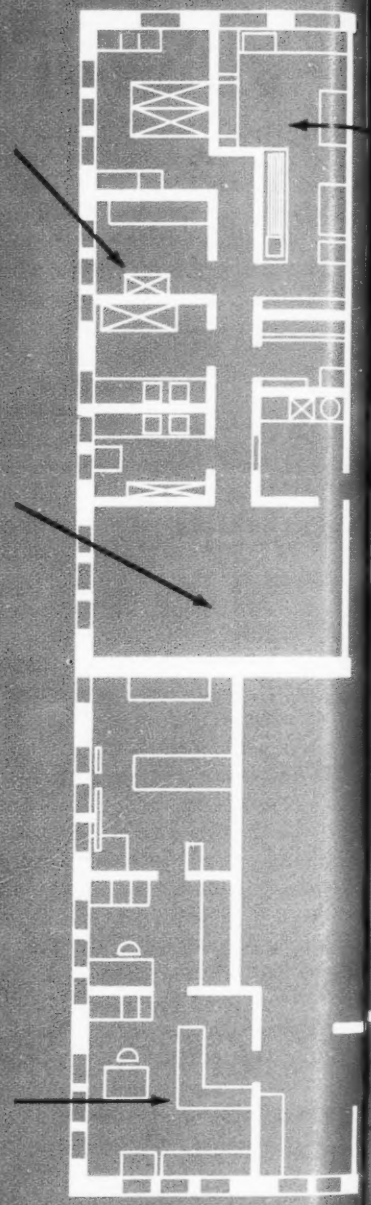
Darkroom: film developing, cantact, enlarging, color and finishing areas need be separated, but pass-thrus strategically placed can save miles of walking. An island sink may double the usefulness of a room. Dark adaptation can be preserved by lighting corridor areas with yellow lights. Test safelighting in use. Blackout should be foolproof.

Overall: rooms should be in a logical relationship to one another. Related work areas should be grouped close to one another to cut down walking. Passageways should be wide enough to move. Large equipment and passage areas should be separated from work areas to avoid interference. Careful consideration should be given to expansion: where will additional work areas come from? How can a transition most easily be accomplished? A facility as big as this cries for an intercom.

Chemical mixing: this unit has none. It should. If it can be located above the darkroom, gravity feed from storage tanks can be used. For smaller darkrooms, tanks with spigots on high shelf are convenient.

Experimental room: industrial work is so varied, and apt to be so specialized that some area separated from normal routine is highly desirable if not absolutely necessary. This is one used for photomicrography, time lapse work, delicate set-ups.

Reception area: not-altogether-welcome guests can throw a monkey wrench into production. A reception area with a stand-up counter close to the main entrance permits efficient service. Note that this is separated from office functions, but that files are conveniently nearby. This is also a dandy place for a showcase of your current masterpieces and a complete sample book—things without which no department can truly be called complete.

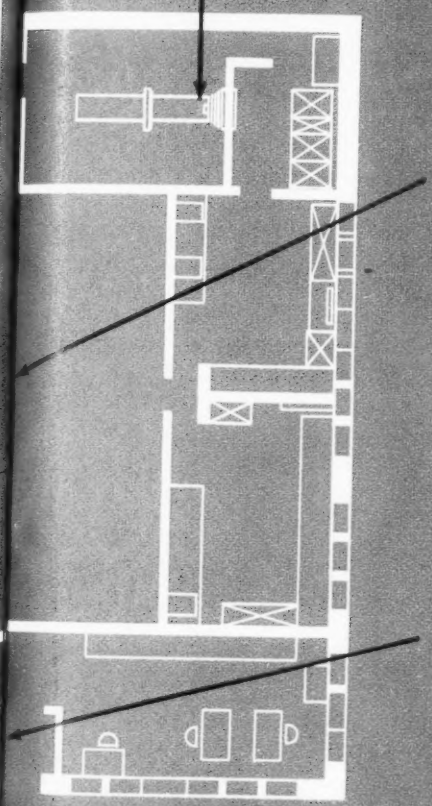


WORK

FACILITIES: no matter how pretty a darkroom blueprint looks, i

is w

Ventilation: a higher pressure inside the darkroom than outside will force dust out. Some areas need special attention. Air should be pulled out from heat and moisture generators: sinks, washers, driers, arc lamps. Incoming air usually needs filtering with clean filters.



Studio: the taller the better. Overhead space may come in handy for prop storage, too. It is better to have too many electrical outlets and an oversupply of current than an undernourished undersupply. If separated from remainder of facility, studio should have a film loading room. A windowless studio may make color balance easier to control. Some photographers prefer a totally white studio (including white floor) for better fill, color purity.

Ceilings: a smooth ceiling can't collect dust. Cabinets should extend to it for dust prevention. Open beams in studio can be an asset for hanging lights, winches.

Walls & floors: a plaster wall in a darkroom is murder to change. Folding walls, metal partitions add immeasurably to flexibility. Wherever optics are involved: projection, copy camera, enlarger, rooms are best painted matte black to reduce flare. Floors should be moppable. A false floor in processing areas could make future changes a good deal easier to accommodate, but building code, low ceilings, may prohibit it.

Office space: clerical and administration functions are just as important to a photographic facility as to any other department of the company; they should be up to company standard. Furthermore, they are an integral part of production; the location of stations should be determined by the pattern of the work flow, not by whim. In this case, supply room is part of office area. It should be readily accessible for deliveries yet secure from pilferage, convenient to users, clean, dry, ample.

ROOM

ks, il is what it represents that counts; here are some pitfalls to search for

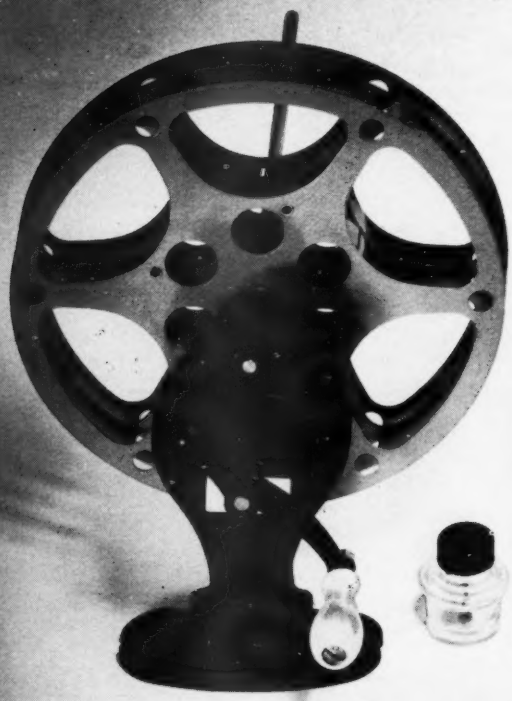
EDITING

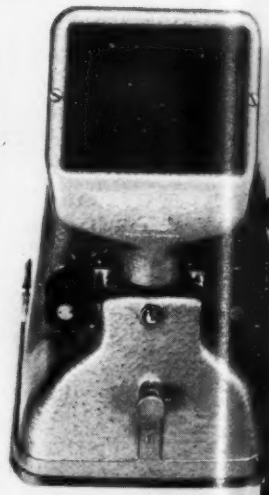
The amateur who laboriously glues a scene of grandma throwing a ball to another scene of baby catching same uses a $1.98 splicer. The cad in the Hollywood movie lab who leaves a starlet's chances for immortality on the cutting room floor has a dozen of everything in his air-conditioned workshop. Somewhere in between these extremes is the in-plant cameraman who was so unfortunate as to be stuck with the job of editing several thousand feet of film on the retirement dinner for the Founder of the Company.

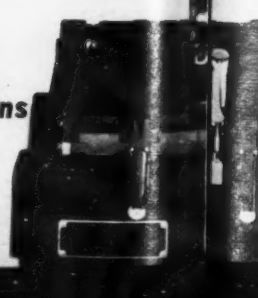
What does he need in the way of equipment? How little or how much should the company spend? Where does editing fit into the firm's photography program? To get some answers, we went to see Ken Abeel, Manager of Film Production, Audio-Visual Communication Operation, at General Electric, Schenectady. This unit has been in the in-plant film business for a long time (see PMI, April 1961, page 48) and has a fairly well-developed editing facility. The discussion, however, was conducted on the basis of minimum requirements for intermittent use where movies are but a phase of photographic operations rather than, as at GE, the responsibility of a highly-skilled group devoted just to film production. Other members of the group are Charles Kupinski, Chief Editor and Ronald Fragomeni, production coordinator and a trained film editor.

The basic importance of film editing (or cutting as it was once called) cannot be overemphasized. It is the most creative phase of the film production process and determines the effectiveness of the final visual message. Bad editing can ruin an otherwise superb film; good editing has saved many a mediocre one. In industry, where a film must act as a spokesman for the company, it is vital that its content says what the company wants it to say and how it wants to say it. In some cases, firms will hire outside production technicians but do the editing within the company. (Bell Telephone Laboratories is a case in point.)

Basically, editing involves cutting







FACILITIES: editing motion pictures requires more brains

scenes from one roll of film, arranging them and splicing the scenes in a desired sequence to get a new roll of film which will be shown. The basic tool is, not unnaturally, a splicer.

There are various types available, from the $1.98 model (which now sells for about $5.00) to the automatic hot slicer which sells for over $1000. The GE group uses Bell & Howell automatic hot splicers which operate through a foot pedal, but a manual slicer such as the Griswold is adequate for practically all requirements. This type of splicer sells for about $40. In shopping for a splicer, look for ease of operation and accuracy in keeping the film in proper registration. For 35mm magnetic sound, a butt splicer (which makes the splice end-to-end) is suitable. However, for picture editing, an overlap splicer is used. This type uses either cement or plastic tape to join the film.

To edit properly, the editor should be able to see what sequences he has and what he ends up with. He can do this by holding the film up to a convenient light bulb, but a viewer is much better. This is essentially a small projector, giving an editor a preview of his film on a screen about 4 x 5 in. Here too, there are various viewers on the market but a good, professional-quality viewer will cost about $100. At GE, the Zeiss Moviescope is used.

Points to look for in a viewer are the quality of the screen image (is it bright, sharp, flicker-free?) and the tracking of the film. A screen smaller than about 3 x 4 in. is not recommended. The film should not only travel freely, but it should remain in the focal plane of the viewer's lens.

Film travel in viewers can be either right to left or left to right. This is a matter of personal preference, some viewers, such as the SOS Ediola, offering a choice.

Once the film is ready for viewing, there must be a method of making it move. The propulsion is supplied by rewinds, a set of geared cranks to which are attached reels of film. The storage reel is on one side, the take-up reel is on the other, and the viewer is in the middle. Turning the crank will turn the reel which will pull film from the storage reel to the take-up reel. Usually, a double set of rewinds is needed, one for A rolls and one for B rolls (conforming is generally done using two rolls with alternate sequences which together match the original film).

Some rewinds operate so that the crank moves in a direction counter to the film travel and others with crank and film travel in the same direction. This too is a matter of choice. A set of professional geared rewinds such as those supplied by Neumade will cost about $50.

Togetherness

Perhaps the most important piece of equipment in editing is the synchronizer, a device for keeping the various silent and sound rolls in frame to frame registration. Thus, if an editor cuts silent footage, he can also work on the sound track and know that both sound and picture will coincide when he is finished. Synchronizers generally have frame and footage counters so an editor can keep track of his

(continued on page 58)

Editing setup (left to right) rewinds, splicing cement, viewer and reader (above) splicer (below), gloves, lock, spacer, synchronizer.

than equipment, but equipment should be good, and convenient

AV

FACILITIES in A-V are here today, there tomorrow—call in

With today's industrial giants sprawled across a continent, the problem of effective communication assumes increased importance. Ideas and information must be exchanged quickly and efficiently—between the company and its public, between management and the shareowners, between top executives and the lower echelons and among the various other groups within the company itself.

It is no secret that the basic answer to communication problems is AV, audio-visual methods. However, merely appealing to the two senses is not the answer. To fulfill its role, a proper audio-visual program implies good equipment and facilities, careful planning and attention to detail, plus that elusive something called showmanship.

At General Electric, Schenectady, these ingredients are supplied by a three-man Staging Operation, part of the Audio-Visual Communications Operation. Heading the group is W. T. Cook, known far and wide in the company as 'Doc'. Assisting are Douglas L. Crossman, Senior Specialist, Staging, and Richard F. Mattison, Specialist, Staging.

Handle with care

This group can handle virtually every type of presentation, from a new product meeting for salesmen to a shareowner's meeting or a top management conference. More important, there is more than reasonable assurance that the presentation will add, rather than detract from the content. More often than not, how the presentation is handled makes the difference between an audience pleading with the ceiling for deliverance and one which is alert and getting the message being delivered.

Few companies have explored the potential of AV presentation to the same extent as has General Electric. Although the Staging Operation was organized on a formal basis in 1949, professional-type staging was done as early as 1935 (a few pioneer efforts date even earlier). The Company found that if a program was worth presenting, it was worth presenting well to assure maximum impact. Programs include movies, slide shows, graphic arts material and skits using 'live' talent. Part of Staging's responsibility is the coordination of these elements into an attractive, unified, effective presentation, planning the whole without overlooking any of the parts.

At GE, the tools include 3¼ x 4 slide projectors for full-scale presentations and 2 x 2 units for smaller groups. There are 16mm projectors, both sound and silent. There is much sound equipment, including microphones, tape recorders, amplifiers, mixers and loudspeakers. Screens of various sizes and types, a good supply of stage lighting units, all the major and minor items needed, are available.

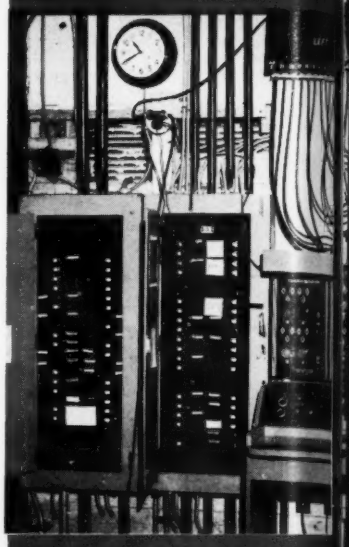
Reconnaissance

Planning for a presentation often begins months in advance when Cook or one of the other two men visits the site of the proposed meeting. They will make an educated estimate of acoustic qualities. They will examine the electrical supply, the floor plan, the stage facilities. In short, they will find out as much about the given situation as possible. Guiding them are four criteria developed by Cook on the basis of his more than 25 years experience with GE presentations. These criteria are: seeing, hearing, comfort and precision.

The first three are self-evident, but the last is the key work in Staging's operating philosophy. It means arranging everything so well that the audience is aware only of the message that is to be conveyed, not of the mechanics of presentation.

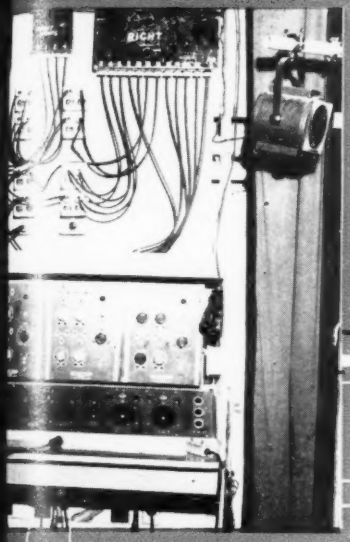
When Staging begins to prepare for a presentation, the first question asked is how big is the room

(*continued on page 42*)

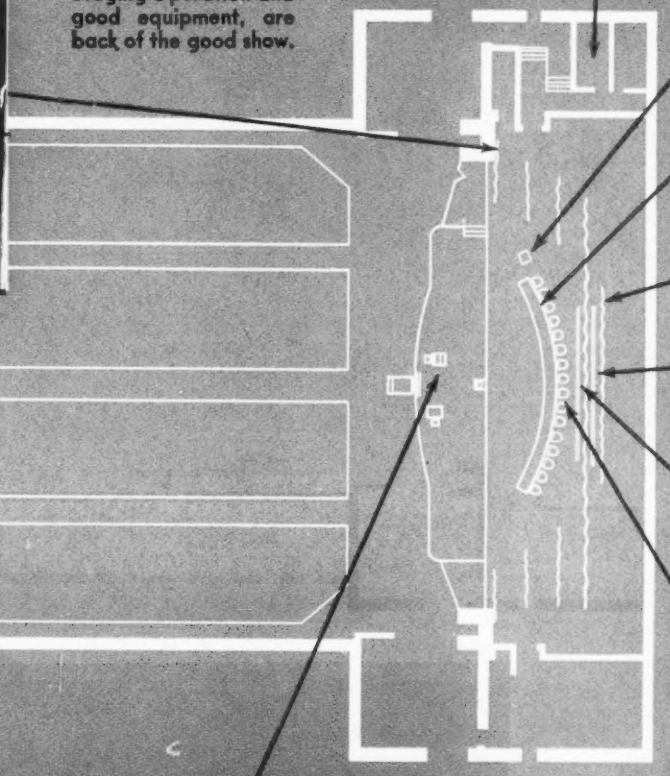


Behind the scenes of the largest of the GE meetings, Staging's job is to pull strings, avert tangles. Most of the strings lead to three mazes shown here: (upper right) tape recorders to keep record straight, light control switchboard, projection booth (below).

...planning, precision, and flexibility to give a show a run for its money



General Electric's A-V is not a bored projectionist running a tired machine to a restless audience. At home or on the road, GE's presentations are smoothly professional. Skill and experience of a 3-man Staging Operation and good equipment, are back of the good show.



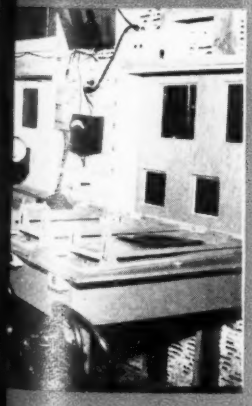
Floor lectern for principal address and slide talks or commentary

Crescent-shaped table —drape to floor on front and ends
(Note: Designed for adequate leg-room)

Backing piece for screen—any dark non-reflecting drapery

General Electric sign rigged to fly out fully during slide projection

The projection screen, rigged to flown batten —but will play fixed



W. T. (Doc) Cook, the Manager of Staging Operation, checks microphones at GE Shareholder's meeting, one of the major shows (above). Public address system control (left) is nerve center for A-V.

in relation to the scheduled audience. Good practice allots at least 10 sq. ft. per person, allowing space for aisles and crossovers. In a short (under an hour) presentation, this may be cut to 6 sq. ft. Floor space alone is not a good indicator of audience capacity since obstruction such as columns and even the shape of the room can seriously reduce the effective viewing area.

Careful planning

Architects' drawings are used to help plan the seating and stage layout and the installation of equipment such as projectors, lights, and public address units. The placement of microphones is determined by the action to take place during the presentation. Sight lines, based on an average seated height of 57 in. are drawn. Distances from the stage to various points in the audience are measured and charted. Every part of the complete installation is thus planned and related graphically to the other parts.

For most slide presentations, a specialty of GE, the 3¼ x 4 projector is used. Where the projected picture size is quite large, a Strong Arc projector will be used. For average size pictures, the Beseler Slide Kings or American Optical GK's are put into service. There are a dozen projectors in this size.

Among the six 16mm projectors are Bell & Howell JAN, Eastman 25 Arc and Pageant models. There are also ten 2 x 2 projectors in the equipment locker. Not all of this is used by Staging. One of the group's subsidiary duties is the loaning of equipment for use by various groups within the company.

A six-channel microphone mixer console, custom-built, handles the sound during a major presentation. At shareowner meetings, for example, there are mikes on the stage for management representatives and in the audience for shareowners, both feeding into one PA system. During question and answer periods, both sides must be able to hear each other. The mixer helps solve problems of acoustic feedback. The mike at the questioner's position not only drives the main PA system, but also drives a small, separate loudspeaker at the Chairman's position. The Chairman's mike drives the main PA system, but *not* the small loudspeaker, thus minimizing feedback.

The quality of sound in a room cannot be determined fully in advance. Sometimes there is an annoying echo or reverberation which may disappear when the room is full of people. Sometimes the room seems adequate in initial tests, only to turn up poor hearing spots later.

Another factor in planning is the amount of off-stage space available for scenery, dimmers, stagehands, etc. In one case, the set of a skit was modified because there wasn't enough room backstage to store it and the order of presentation was reversed to permit desired changes to be made during an intermission.

Preparations for presentations extend right up to showtime. Many times a speaker will deliver his slides so late that someone from Staging will have to work into the small hours until every slide is cleaned, properly tabbed and in proper order for projection.

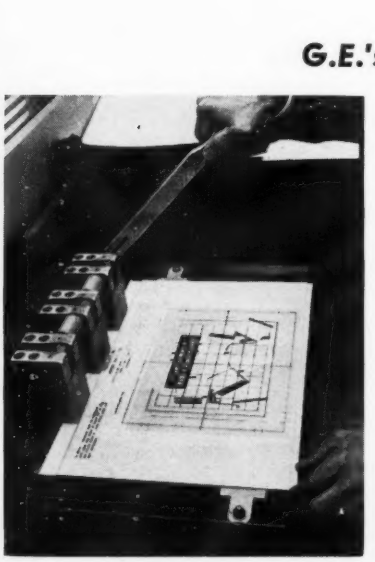
Equipment is checked for weak lamps, dirty condensers, burned-out tubes, loose connections, etc. Cook's motto is never trust anything. Test it, check it, fix it, then test it again.

Even with the best of care, accidents happen. For example, during one presentation, the main curtain came out of the track when opened for the film prologue. It was put back completely during the film so that when the skits came on, the curtain functioned perfectly.

Physical comfort of the audience is a very important factor in successful presentations. Is there sufficient ventilation to permit smoking? Are there rest rooms nearby? Is room heating or cooling adequate? Can everyone hear and see well?

The most tangible sign of GE's concern for effective presentation

G.E.'s equipment, mostly made or adapted on the premises,



Art material, prepared to specified tolerances and designed for specified aspect ratio (ratio of width to height)

is mounted in template (left) using a registration punch to insure proper alignment. It is then placed on register pins on copy board of copy camera. Registration assures proper positioning of overlays within exacting standards.

is the precision slide, a 3¼ x 4 slide made to extremely high standards of accuracy. This permits various effects to be used with perfect juxtaposition. This slide was developed in 1954. It is prepared to fit a specific aspect ratio and to give precision register during projection.

About 1955, the precision slide was developed. This is a standard 3¼ x 4 slide which is prepared for a specific aspect ratio with the artwork done to an high accuracy. It was designed to improve GE slide presentations by making possible precision-register dissolves and growth sequences (where two or more slides are projected in succession to build up an image in progressive stages).

In addition to improvement in the slide and art, a custom-built slide-carrier which could position the slide accurately was designed. This carrier, made in one of the Company's own model shops keeps the center of the slide on the axis of projection. Vernier adjusting screws are used to "zero in" the alignment for any new set-up of the equipment—and to maintain accuracy. The precision carriers are used with the Strong Arc projectors.

The artwork for precision slides is produced to comply with any one of several aspect ratios. This ratio may be 1.33:1, 1.65:1, 1.75:1, 2.00:1 or 2.33:1. The ratio selected depends upon the height and width of the screen area that will be available or most practicable in a given situation.

Precision slide operation

Standard templates are used to guide the artists. After checking alignment the art material (which is done both by outside artists and by GE's in-plant section) is punched to fit a specially-designed copy board. This board keeps the material in precise alignment during copying.

Naturally the film used for copying varies: both for black-and-white and color—the selection being determined by specific conditions.

The slide mounting is done in a precision jig. Three photo-electric cells position the transparency, which is held in place by a vacuum attachment, in relation to an accurately held cover glass. The mask of the slide is itself a photographic image on a standard high-contrast ortho plate. When the slide glass, transparency, and photographic cover glass are all in proper relation, the slide is bound using standard slide-binding tape.

As far as is known, GE is the only company using such care in the production of slides.

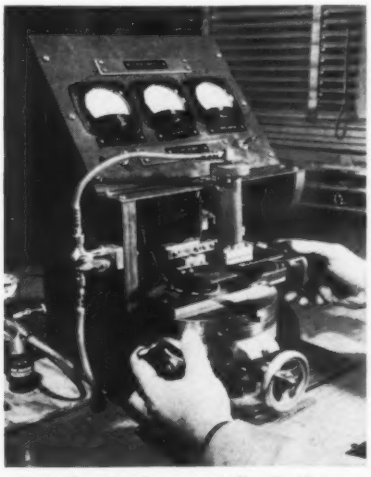
Projected picture quality depends on several factors besides quality of the transparency, the projector, and the size of the image. Ambient light (room light) can degrade the quality of the screen image, especially with color, if it is not controlled. This means not only careful control of light level in the room or auditorium, but also such items as spill from the speaker's reading light.

Recent observations have found that if very large screens are used, less screen illumination (image light) is needed than was formerly thought necessary. However, these are special cases and there are minimum acceptable light levels for good projection. In a fully darkened room, at least 5 foot-lamberts must be available on the screen. However, because it is preferable in most meetings to maintain a low level of room illumination, higher levels of screen illumination are required. (*For a good basic guide, see Kodak pamphlet S-3, "Foundation For Effective Audio-Visual Projection" (available from Eastman Kodak Sales Service, 343 State St., Rochester, N.Y.*—Ed.)

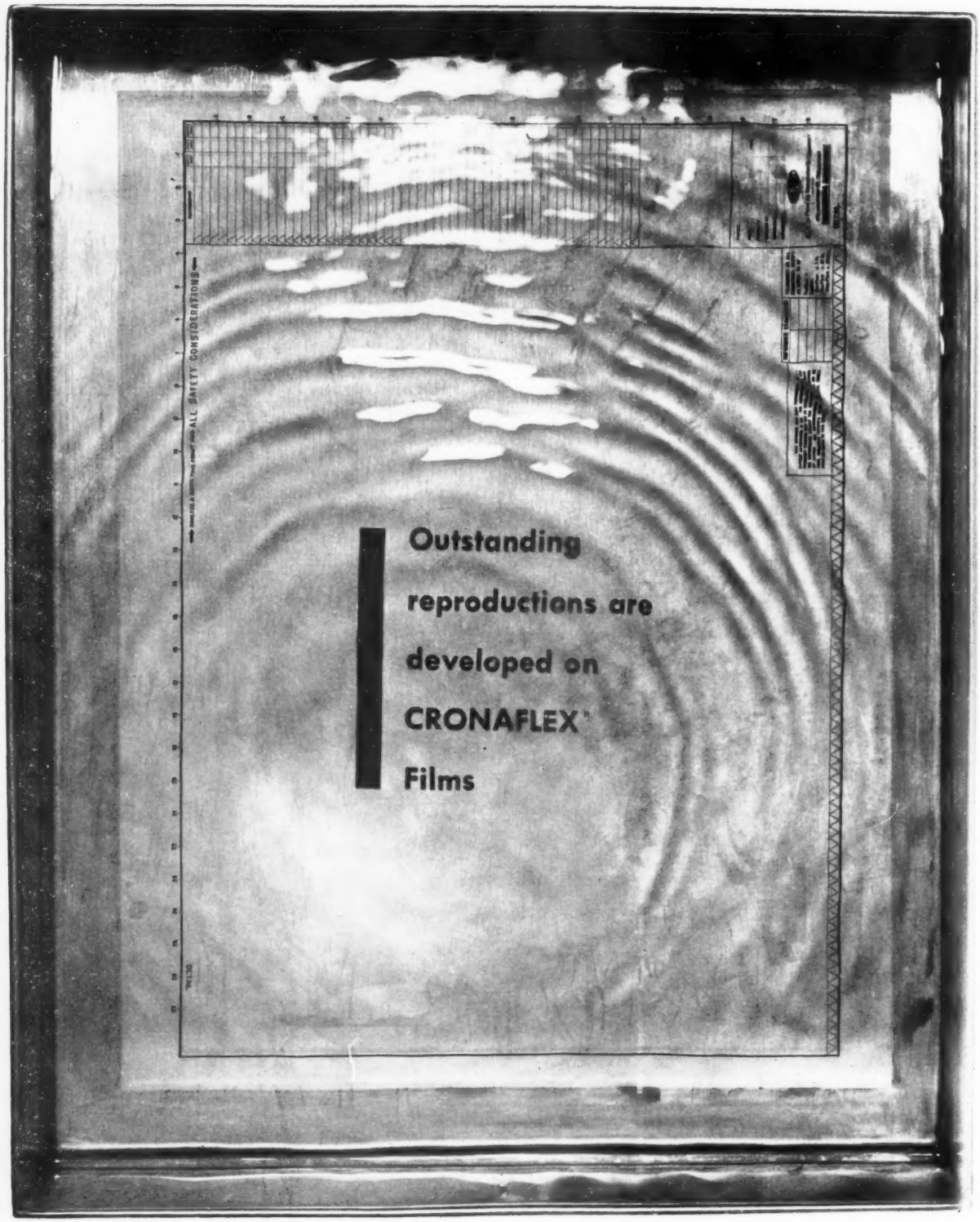
In essence, Cook feels that complete preparation, a thorough knowledge of available equipment and of the meeting place itself, and an experienced staff are the keys to successful audio-visual presentations. If a presentation is important enough to do at all, it is important enough to do with professional competence in all its phases.—THE END

cuts out waste motion, guarantees clean, precision slides

Photo section at Schenectady handles copying. In addition to the slide, the cover glass and mask are prepared accurately. This special slide-mounting jig (above, right) was developed in company shops to handle precision slides. Three



photoelectric beams tell whether or not slide is aligned properly for binding on vertical, horizontal axes.



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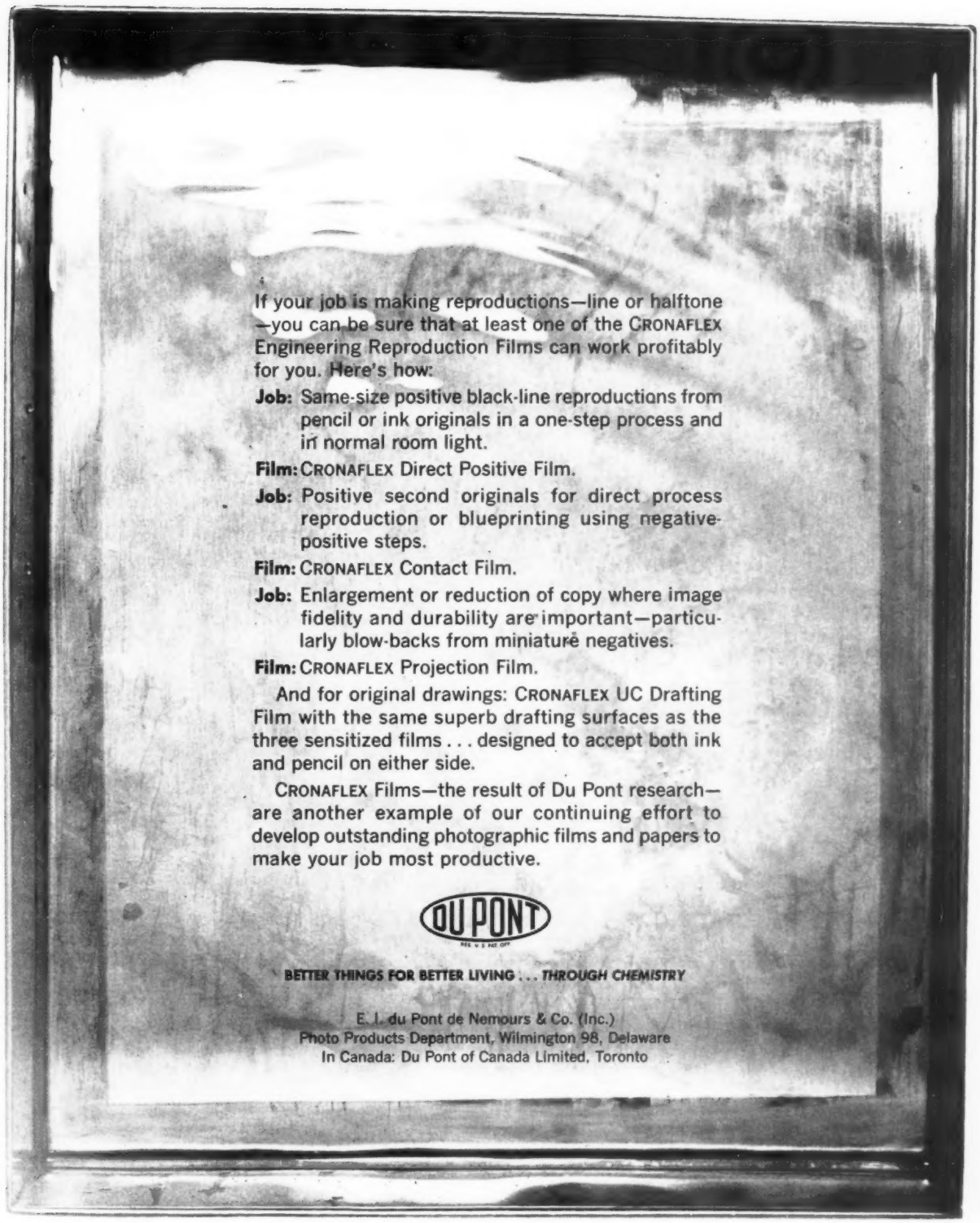
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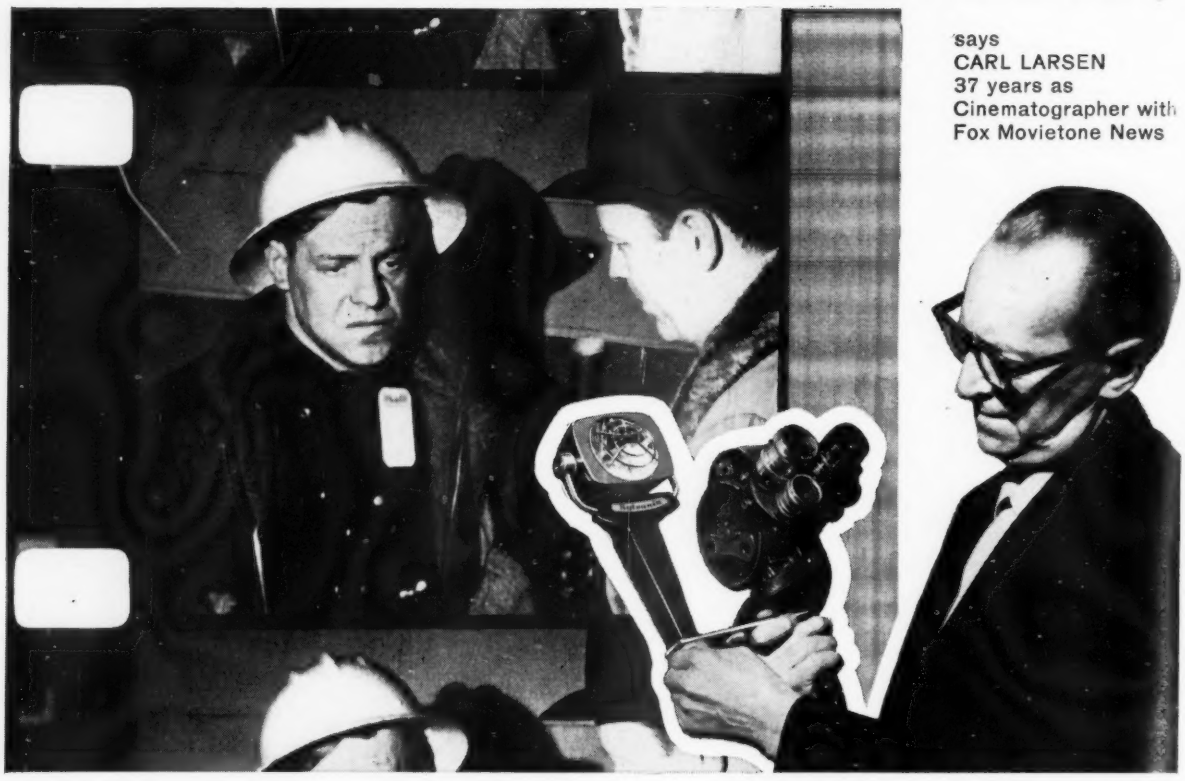

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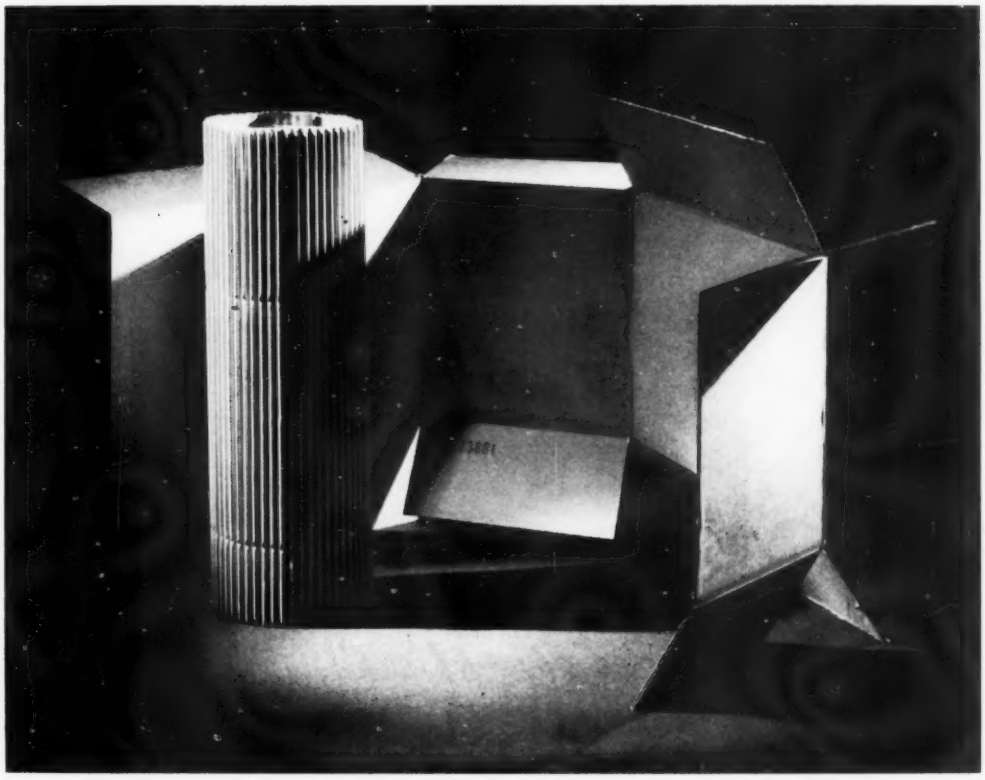
PORT-FOLIO NO.33

Joan Liffring

...ith the idea that photography is a way of seeing and learning, a part of life that extends well beyond the 9 to 5 workday, Joan Liffring of Cedar Rapids, Ia., has been doing industrial freelancing successfully for nearly 10 years. Her fine results may be due to an understanding of her subjects or to efforts in the darkroom to produce exceptional composition and tone. Or perhaps it's her way of tackling a problem, as in this photo for the Collins Radio Co., taken in an airport hangar.

Using a Hasselblad 80mm (1/30 at f/8, available light), she threw the background men out of focus to emphasize a nationally known equipment engineer in the foreground. In the photograph (left) for the Iowa Electric Light and Power Company, Miss Liffring used a #2 floodlight with built-in



reflector at right and smeared cold cream on the men's faces. She posed them uncomfortably on their knees to produce the tense look, and used black no-seam paper for background. The advertising shot (above) for the Hoerner Box Company was taken with a B & J View Camera on Super Pan Press Type B for 1 min. at f/64.

With the help of husband Art Heusinkveld of the Cedar Rapids Gazette, Miss Liffring has turned out three illustrated children's books on farm life, now being used in many public schools in the Midwest. The scene below

from "Jim and Alan on a Cotton Farm," was taken with a Rolleicord, with K2 filter, on Verichrome Pan. Exposure was 1/60 at f/16. Photograph of linemen (right) for Iowa Electric exposed on Plus-X, 1/25 at f/11, with Hasselblad.

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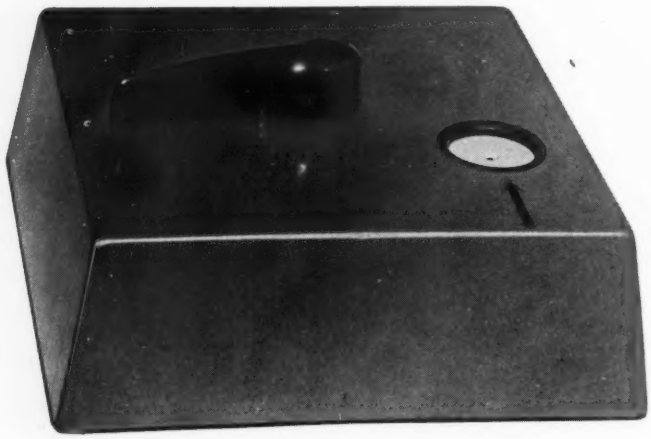

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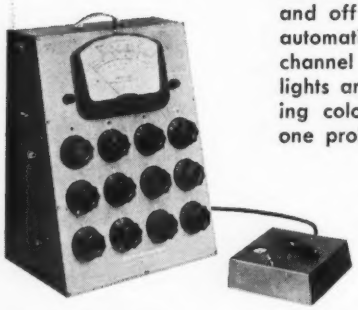

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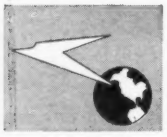

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(continued from page 22)

tivity from 0 to 12,000 foot candles. It reads directly from 0-12 to 0-600 foot candles. With a 20 times opal disc multiplier one can read from 0-240 to 0-12,000.

The Kling Company distributes another new light meter which has created quite a stir since it was first introduced at the 1960 Photokina Show. This is the Gossen Lunasix, which has a foot candle conversion scale on its case. It is built on a new electronic principle which utilizes a semi-conductor and a tiny long life mercury cell battery. According to their literature, it is 258 times more sensitive in the low ranges than any exposure meter that utilizes the more conventional selenium cells. Its eight-hour exposure reading may be of great importance to the still photographer; not especially so to the movie cameraman whose main interest is centered around 1/50 of a sec. However, it has other features of much greater interest to the movie maker, such as a hemispheric diffuser for incident light measurement. This slides to the side (you don't have to take it off) to expose the photo resistor cell which is used for reflected light reading. For direct foot candle reading you use this unobstructed photo resistor cell by pointing it toward the light source. It is not claimed that the Lunasix is a complete foot candle meter; it can be used as one with limitations. For a true foot candle reading I would recommend the Gossen Tri-Lux.

Spectra

The Spectra, by Carl Freund in Hollywood, has a number of features for foot candle readings. It is designed mainly for incident light reading (reflected light attachment optional). It has a dual scale and can be read directly, either in "f" stops or in foot candles. Each meter is individually calibrated. It comes with 13 individual ASA exposure index slides, for the various speed films. When you load your camera, you use the slide that corresponds with the ASA index of your film; from then on you get a direct reading on the scale for 1/50 of a sec., without any further calculation.

Another professional motion picture light meter is the British Jaro-Salford, distributed in the United States by Camera Equipment Company of New York. It can be used

(continued on page 55)

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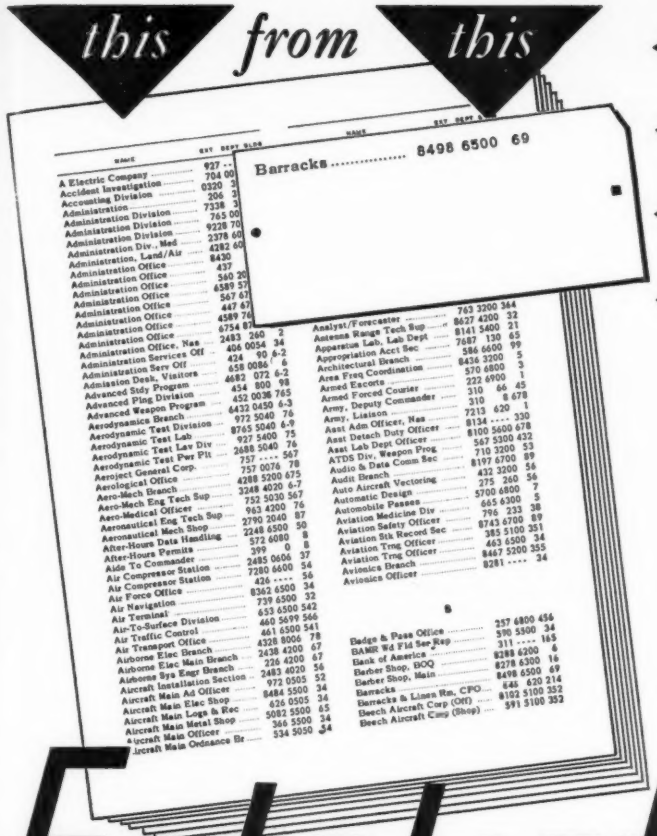

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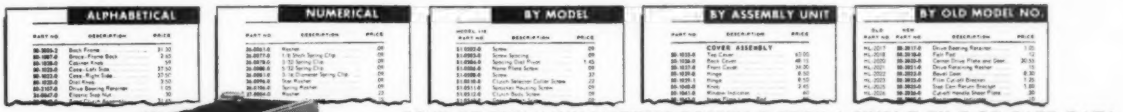

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IND. MOTION PICTURES

(continued from page 52)

for reflected or incident light reading. Incident light can be read directly in foot candles. A computer is used to read reflected light. This meter is quite versatile; it has all kinds of interchangeable parts, and the range extends from 0 to 25,000 foot candles. The cell unit may be removed from the meter unit, and while still attached may be extended a few feet to make the reading easier. In the same class is the SE1, distributed by Zoomar, Inc., of Glen Cove, N.Y. This instrument reads brightness range of from 1 to one million, and has an acceptance angle of one degree.

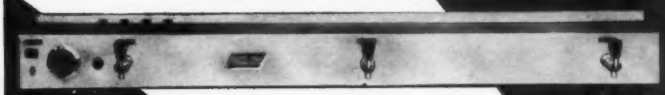
Among the more popular priced meters that are practical for foot candle reading are the Sekonic Brockway, Model S, and the Norwood meter. These are the original incident light meters, with hemispheric light collectors. With opal discs they become direct foot candle meters, with a range from four to 32,000 foot candles. The cell element swivels on the meter and calculator part for more convenient reading.

The General Electric "Golden Crown", type PT-3, can be used as a foot candle meter by transposing the incident light scale to the equivalent in foot candles. The Weston Master IV is designed chiefly as a reflected light type meter. With the Invercone it becomes an incident light meter. In emergencies, it may be calculated in foot candles. But if you want a Weston foot candle meter, you should get the Weston Model 614, with a flat disc for direct foot candle reading. The "photromic" cell is mounted on a hinge for convenient reading.

The incident light meter has many advantages over the reflected light meter in indoor motion picture photography. It enables the cameraman to walk quickly over the whole set with his meter in his hand to determine if he has any special "hot spots" or "dark holes" in his lighting. It also permits him to take a reading of spots the subject is going to occupy without exposing his subject to the hot lights.

Whatever the method or meter used, however, what counts is the exposure that reaches the film. Counting to three won't work with movies, but neither will a meter without skill and judgment in its application.—THE END

Get more information. Circle 465, page 69 ➤



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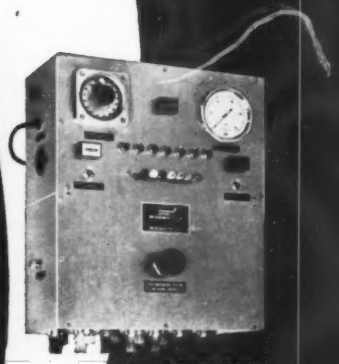

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Ways for half-grade contrast

Constant practice and the familiarity it breeds long ago taught the discerning professional that *kinds* of photo papers were different. Different in many respects. But for this discussion, let's stick to contrast.

Every professional photographer knows that no matter how abundant his skill, how complete his equipment, there will be the occasional negative that would print best on an "in-between" contrast grade.

Now, of course, it *would* be possible to belabor the situation and provide half-degrees of contrasts in the most popular Kodak papers.

Sounds silly and costly today, doesn't it? Especially when the same close contrast control—*to the half grade*, plus even selective contrast control within a single print, is possible, practical, and being done daily out of one box of quite remarkable paper.

This box may contain one of three papers, each with a different speed and image color, but all with the same half-grade contrast range. The names? 1. Kodak Polycontrast Paper 2. Kodak Polycontrast Rapid Paper 3. Kodak PolyLure Paper.

Which one is for you?

All three, quite possibly. Polycontrast Paper has medium speed, warm black tone. Polycontrast Rapid has a somewhat colder tone, and greater speed. PolyLure is a warm-toned portrait paper. With reduced illumination, Kodak Polycontrast and PolyLure Papers are fine for contact printing—lend a new uniformity to contact prints and enlargements.

Since the same techniques yield the same high quality with all three papers, you might well want to have yourself ready for *any job* by keeping some of each on hand.

No, these are not "emergency" papers

These papers have acquired a reputation in some circles as "emergency" papers—the box you reach for when you've got a negative that won't yield a good print on regular paper.

True, as we'll see later, Kodak Polycontrast Papers do have the ability to put new life into what once may have been a hopeless negative. But because all three have this talent for making high-grade prints in unusual situations, it follows that they can also do a high-grade job in normal situations.

One paper—seven contrast grades

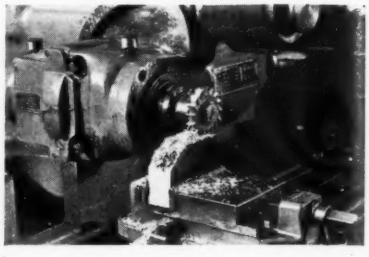
There are seven contrast grades built into each sheet of Kodak Polycontrast Papers. Grades 1, 1½, 2, 2½, 3, 3½ and 4.

These papers eliminate the need for stocking numerous grades of the same paper. Result? Less inventory. Less costly inventory. No seldom-used grades to go out of date. Since there's now just one box of each to buy, that box can be a big one—with resultant quantity discounts.

You sacrifice no quality at the altar of convenience when you use Polycontrast papers. In fact, you'll probably note a new depth, a new brilliance in your prints. That's this paper's high *d-max* at work. All three types have it. Naturally, this means blacks with depth, a long tonal range, and new snap in print contrast, as you'll see it.

Let's put the principle to work

Even under closely controlled exposure conditions, such as in-plant setups,



negatives of slightly varying contrast are bound to happen now and then. Contrast in these, of course, is easy to bring up or down, to just-right contrast with these Kodak papers.

Print the minus or plus negative with the appropriate Kodak Polycontrast Filter—say a 2½ for the minus, a 1½ for the plus.

On the other hand, with "normal" negatives to begin with, print them *unfiltered* on Polycontrast, Polycontrast Rapid, or PolyLure Paper for an on-the-nose grade-two result.

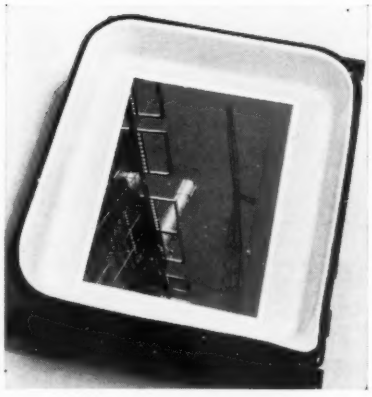
Now, take a situation where location shots exposed under widely varying light conditions must result in pictures that will be used together, and the advantages of this paper's flexibility multiply. Such pictures can be printed with enough contrast juggling to make them suitable for a portfolio presentation.

And when the worst does happen...

Every now and then every professional has a negative that defies printing . . . and it's a picture which cannot be taken over. Polycontrast papers may save the day.

If, for example, the negative is a confusion of varying contrasts and results in a print like the one above, you expose each different contrast area through the appropriate Polycontrast Filter, while dodging out the other areas. No, it's not simplicity itself, and you won't be doing it every day, but it's nice to know that these three Kodak papers prepare you for such an eventuality. For with any one of the three, you can correct such a print to the same extent as we have done with this one.

All the boxes of single-contrast paper in the world wouldn't do this job.



Here's what Kodak Polycontrast Papers won't do

They will not change density from developer to hypo. Will not curl in developer or wash water.

Will not change tone when dried on a hot drum. Will not limit you. Any negative, any technique (even contact printing) goes well with them.

For many, the all-purpose paper

Industrial photographers, for instance, applaud the versatility of Kodak Polycontrast Paper. They find it equally adaptable to in-plant, location, or product shots, even executive portraits. Then, too, one box of Polycontrast gives the speed they need for making large quantities of glossies, plus (with reduced illumination) enough flexibility to make contact prints. If the prints are to be shown together in a portfolio or display, there's no worry about matching tones.

What it takes...

To unlock the seven contrasts built in, you need a Kodak Polycontrast Filter Kit, or a set of Kodak Polycontrast Acetate Filters for the enlarger lamphouse or contact printer.

If you haven't already done so, you'll want to replace your safelight filters with a Wratten 0C. You may note a slightly lower light level, but it pays dividends in safety—with any paper.

There are no changes in chemicals, washing, or drying.

Ways well worth talking about

The change-over from a single to a multiple-contrast paper is hardly an involved one, and the more meticulous you are, the more it behooves you to at least talk to your Kodak Technical Representative about the ways for half-grade contrast. Even if you have never felt the need for such close control, he can demonstrate to you how Kodak Polycontrast Papers can help you. Order a box from your Kodak professional dealer. It could easily prove to be one of the most significant purchases you ever made.

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EDITING

(*continued from page 39*)

footage or be able to match frame for frame if he is working, say, from A and B rolls. The minimum is a two-track synchronizer, used for sound track and picture footage. If the editor plans to do his own conforming, that is, matching A and B rolls to a work print, he will need at least three tracks.

Look for models with counters and with sprocket wheels at least four inches in diameter. At GE, the picture is on 16mm while the sound is on 35mm, so that the model they use accepts the two sizes on separate heads. A variety of combinations are available: one 16mm and one 35mm; one 35mm and two 16mm; two and two, etc.

Synchronizers cost from $135 to $350 for types such as the Neumade Synchromaster, depending upon the number of heads.

The ultimate in synchronizers are the combination sound and picture viewers such as the Moviola. Here, sound track and picture are run through parallel tracks in synch so that the viewer screen offers a preview complete with sound. However, the price, over $2000, makes them uneconomical for all but the largest sections.

What is the use of synchronizing sound and picture unless the editor can hear as he sees? This problem is handled by the sound reader, an attachment which "reads" the sound track (either magnetic or optical) and reproduces it aurally. At GE, they use a Moviola, but suitable models are available from various movie equipment houses with prices in the $200 range.

It should be noted that each operation has problems of its own which makes certain pieces of equipment more suitable for its use than other equipment which may be of equal quality or value. Abeel, Fragomeni and Kupinski all stressed the need to examine carefully the various items on the market before buying. Fortunately, the problem is not so much a matter of quality as of suitability. If requirements are not known or if there is a strong possibility that they may change, the film group suggests that equipment be rented or leased.

Large supply houses such as Camera Equipment, Florman & Babb or S.O.S. Cinema Supply, to name only three, are excellent sources of information.

In addition to the major items listed above, editing requires odds and ends which can make a big difference in the quality of the product and ease of operation. The ubiquitous white cotton gloves are typical. They are important (**never handle original film without wearing them**) and should always be kept on hand. They can be washed but some sections throw them away when they get dirty and grease-stained. The cost of gloves (about 25¢ a pair) is negligible compared with the cost of film.

A supply of grease pencils for marking film and fresh film cement for splicing should be available in liberal quantities. Film cleaner is another item to keep in the supply closet.

There should also be a place for storing the strips of film cut from the complete print. These are the building blocks for the new movie's structure. A common method is to hang the strips from a rack, leaving them dangling with their ends in a lined barrel. The fiber barrels and racks cost about $40 complete: lining for the barrels are $5.

Fragomeni uses a simple variation, merely tacking film strips along the top of a box about four feet high and about a foot wide and 3 ft. long, using masking tape. Kupinski, on the other hand, keeps the strips rolled up in a compartmented flat drawer. While this method takes longer to establish, it is easier to find a required piece of film than if he had to dig through a barrel. Here too, it is a matter of taste and temperament.

What will the final cost of establishing an editing facility run? Here is a rough estimate based on the type of equipment described above.

Splicer	$ 40
Viewer	100
Rewinds (2 pair)	50
Synchronizer (3-track)	200
Sound Reader	200
Miscellaneous	60
Total estimated cost	$650

The above total represents little more than a basic outfit. It is most likely that a more complete outfit including, for example, a hot splicer which, even at $200, is not conspicuous consumption, would bring this total to the $1000 mark.

Is it worth it? This depends on the amount of moviemaking done, on the facilities available, on the skill of the person who would handle the editing, on management's willingness or ability to spend the money. But whether done in-plant or by outside firms, editing is definitely not a luxury in the world of movies.—THE END

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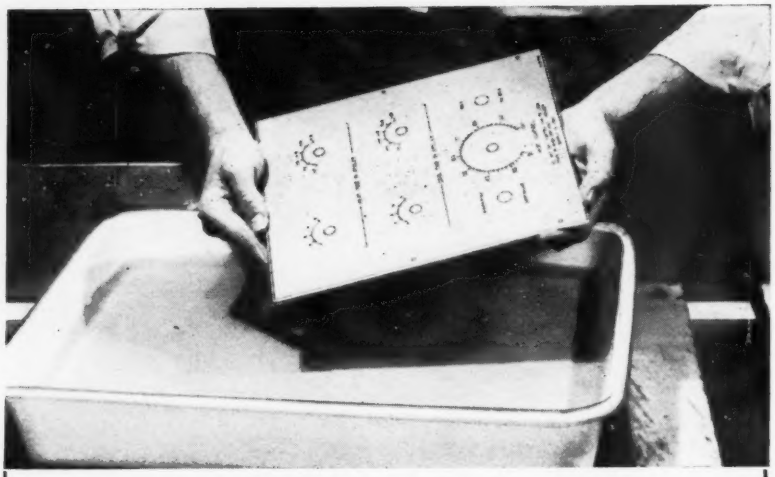

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cycle should be arranged to be close to the beginning, and a set of these process charts will make clear the cycles involved in your work.

Evolving the plan

Because they are so often neglected, it might pay to give first attention to the support facilities that can really affect your production. There should be space for experimentation, for testing new ideas, for checking equipment. If you have a photomicrographic set-up now and again that would interrupt normal activities or vice-versa, such a space can be invaluable. There should be space for cleaning tools, for occasionally used equipment, for your reference shelf. Props and set-ups require out of the way storage between jobs. In many organizations, a reception area away from the work areas is a must. This might be an ideal place for a photo display and, that much neglected service, a stock picture library.

The process diagrams are not plans for facilities, but they are valuable guides for planning facilities. Another valuable tool is a scale diagram of your space, and paper cut-outs. The idea of this tool is well known, and photo departments who have employed it have found that it really helps. By checking your arrangements with the process diagram mentioned earlier, planning for the most efficient use of space becomes a straightforward matter. Once you've done the best you can, it's up to a professional engineer or architect to adapt your working plans to drawings for workmen. He's got to worry about legal codes and company construction policies, safety, construction and the rest.

These important considerations may make it necessary to alter your plans, or even scrap them and start over again. But as long as the final plan follows from what you must perform in your facilities, as long as it is flexible enough to absorb the changes that are sure to come, you'll be in good shape.—THE END

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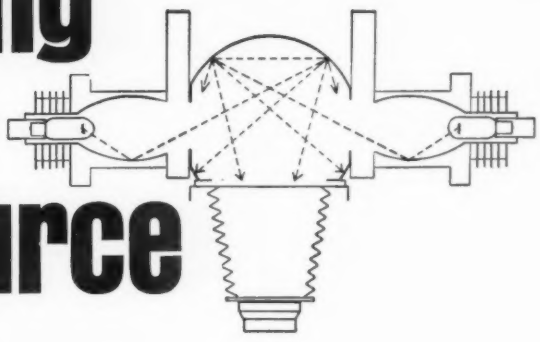

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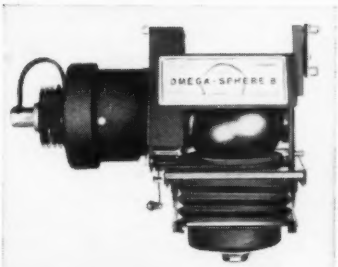

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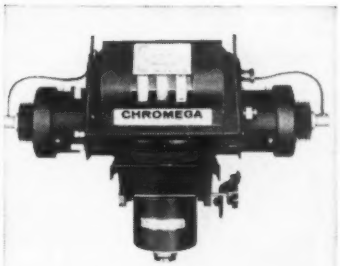

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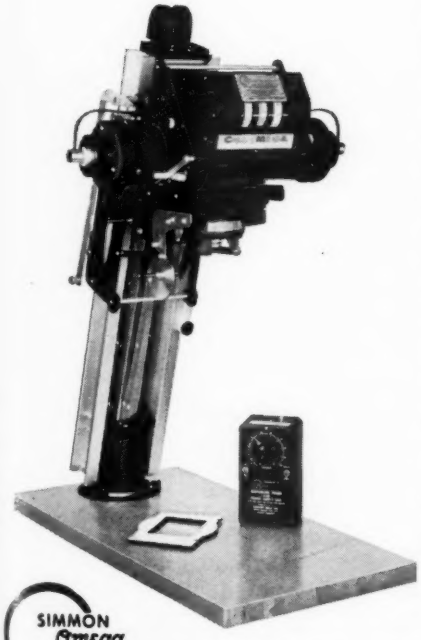

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LIGHTING

(continued from page 34)

important for specialists to learn the limitations of each other's techniques in arriving at the best possible combination. Unhappily, one can find many excellent examples which have been wrecked by lighting that is inadequate from one point of view or another, and . . . it is time that standards were established."

I heartily agree with Mr. Murphy. But I would put the "problem" of getting the photographer and the display maker familiar with each other's techniques in second place. His use of the word "specialists" is a bit too generous. The first problem, as I see it, is to establish an abundance of specialists.

The literature (periodicals and books) contains many excellent discussions on what one can expect when photographic prints or transparencies are exhibited under lighting and surrounding conditions that differ appreciably from the conditions under which the originals were evaluated. It has been noted repeatedly that in some instances wide deviations can be tolerated without particular harm, judged from the reactions of independent observers. Equally emphasized has been the fact that rather minor differences between the lighting conditions used for evaluating certain pictures and those prevailing during their exhibition can result in most peculiar and unexpected reactions (not always unfavorable) from observers.

Out of the bulk of data available very little has filtered down to the practicing photographer. I venture to say—even without factual evidence—that the most common comments expressed by photographers when they see their work in an exhibit are, 1) "They sure stuck my prints back in a corner" and 2) "The flesh tones and reds in my transparencies are much better on my viewer."

The same sort of attitude is frequently carried through by such photographers to their industrial or commercial practice. They learn, in effect, by experience alone, and do not always get a grasp of what it's all about. As a result, each new undertaking becomes a new experience and nothing seems to tie together. I know an actual case that is a good example of such muddle-headed thinking. A firm in Indiana started in business some years ago to specialize in making large photographic murals for hotel lobbies, cocktail lounges, etc. The first order they received was for a tremendously large patchwork mural to be spread around the walls of the cocktail lounge in a hotel being remodeled. A "flunky"—and I mean *flunky*—was sent out to check the dimensions of the walls which, naturally, he measured with all lights on. That was the only direct contact this firm had with the hotel.

The finished photo-mural was shipped on schedule and mounted on the walls, also in bright light. Everything looked hunky dory. But when the cocktail lounge opened for business, the dim lighting made the photomural look like a dirty, unfinished wall.

Now (going back to the first paragraph of this column) why couldn't the experience gained by the practical photographers in this firm during darkroom development of prints be applied in this instance? Obviously the contrast and density level of the mural should have been adjusted so that the scenes appeared satisfactory under low levels of illumination. Prints should be evaluated under the same lighting conditions as the viewing conditions, or as close to these conditions as can be approximated. This sounds so ridiculously obvious that many PMI readers may feel offended. But let's not kid each other. When I make black-and-white prints I judge them in the white-light work room available to me. I just *assume* that they will be properly lighted wherever they might appear. And so do most photographers. It's not good practice, though. (If interested, write me for a bibliography.)

The lighting of color prints or transparencies for evaluation is bound to the lighting employed in display much more rigorously than discussed for black-and-white photographs. The general rule is the same, however. That is, a photographic color image should, ideally, be evaluated by lighting conditions closely equivalent to those most likely to be used for viewing the color image. But this is more easily said than done in actual practice. On the one hand photographers are concerned with the "accuracy" of reproducing the colors of a given subject and they prefer for this purpose illuminators whose light sources are different from those most commonly used in the display field. On the other hand, it is difficult to argue against the use of fluorescent lamps for display cases even if the color quality is not everything to be desired.—THE END

DUST & DIRT

(continued from page 34)

Although many old labs use slatted duck-boards in the wet side of the darkroom, be sure that they are readily removable, and are cleaned along with the floor underneath.

Many darkroom designers, these days, like tile, or linoleum, vinyl, or wall-board walls. At any rate, hard, smooth-surfaced walls that can be washed down occasionally are desirable. Len Zoref of K & L Color says they use walls painted with washable paint, but specify the paint be *sprayed* on so that it penetrates into corners and seals joints well. Where vinyl and linoleum are used as counter tops or as partial wall coverings, rounded or cove joints will help eliminate pockets that catch dust.

One of the worst dust catchers in darkrooms is the maze of overhead pipes that invariably grace every darkroom. They make an ideal hiding place for dust which can be dislodged by the dust gremlins at just the wrong time. Boxing them in with even a simple wallboard structure, easily removable for plumbing service, will do much to help keep a darkroom dust free.

For an industrial darkroom that is near a manufacturing facility, careful placement of doors may prevent constant attacks of airborn dust. And if photographers go into areas like foundries or chemical manufacturing facilities and return with clothes and equipment contaminated, an "undressing room" where clothes can be changed and equipment cleaned *before* re-entering the darkroom will save many a dust spot (and a spotting of final prints).

The darkroom ventilation is also a major factor in whether you have a big dust problem or not. The general theory is that you maintain a slight *positive* pressure in the darkroom area; that is, you always have slightly more pressure than in surrounding areas so that leakage which occurs through cracks, baseboards, door jambs, etc., will all be moving from the inside to the outside. This will blow floating dust out, eventually.

Easiest way to maintain the positive pressure is by forcing air (well filtered) *into* the dark room, allowing the excess air to squeeze itself out (perhaps carrying dust out with it). You may ask why not seal off a darkroom along baseboards and cracks, but this is difficult to do, and Al Peed, who is a Kodak ex-

(continued on following page)

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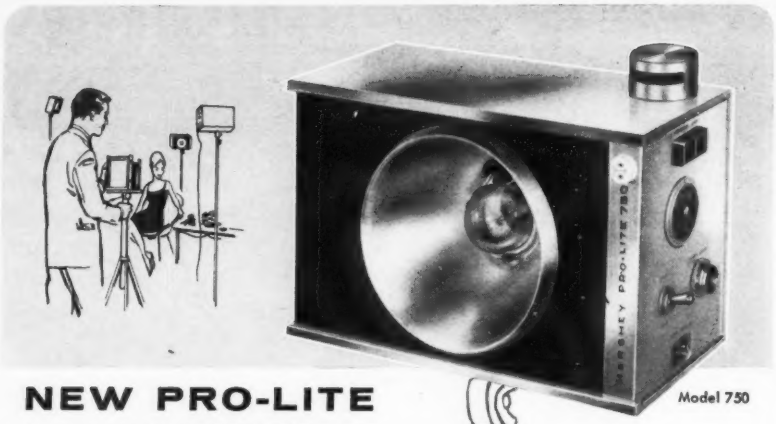

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- FAST recycling—ACCURATE ready light!
- Outlet for Sun-Ring auxiliary flash! 110 V convenience outlet!
- Completely new design—LOOK! Better yet, TRY IT!

Manufacturer's suggested retail price **$79.95**

WRITE FOR FREE Hershey manual

HERSHEY *A Division of Simpson Electric Company*

PRO-LITE 750

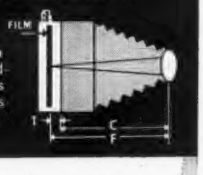
853 Dundee, Ave. • Elgin, Illinois

Get more information. Circle 429, page 69

New FIDELITY gives SHARPEST FOCUS possible!

4x5 and 5x7 Holders surpass A.S.A. specifications

HERE'S WHY! Focus F depends on accuracy of T . . . film to camera distance. American Standards Association specifies ±.007". Fidelity gives ±.001" to ±.003"!



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FIDELITY MFG. CO.

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Get more information. Circle 420, page 69

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Instant Lettering brings you the finest, most meticulous lettering in the world instantly—by instantaneous dry transfer from type sheet to any smooth surface. Just press and it's there.

No trace of adhesive to sully artwork. Needs no equipment. Perfect on wood, paper, card, glass, metal, film . . . in fact any smooth surface. The right answer to the need for highest quality lettering for display panels, roughs, signs, labels, graphs, charts, TV cells.

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How it works:
rub on letter with pencil . . . lift away sheet

Send for sample and complete type chart

ARTHUR BROWN & BRO., Inc.
2 W. 46th St., New York 36, N. Y.

Get more information. Circle 409, page 69

pert on industrial darkroom design, points out that this not only leads to circulation problems, but might lead to suffocation if the air supply was suddenly cut off! The idea of forcing fresh air in instead of sucking stale air out is generally used today. But the old exhaust fan that used to be used to clear the acetic acid fumes can't be used with this, for it would create a negative static air pressure and upset the system. Rather, a good system should completely change the air in the darkroom six to ten times an hour. More than this might be drafty, less won't keep fumes down.

Many modern buildings have fine air conditioning systems, nonetheless some care should be taken in the photographic area to be sure that air ducts supplying the darkroom should be inspected occasionally to see that dust hasn't settled in them through a faulty filter. Even though the system itself is well filtered, smart photographers have found that a glass-wool filter, double thick, over every intake port will need cleaning or replacement every month or so. And if you think your air is supplied clean just because the main system has filters—ask any alergy victim why his nose runs indoors in pollen time!

It's important to eliminate drafts—for they move dust around and keep it in the air. Some labs use heavy cheese cloth or similar porous material as a baffle over air ducts to cut down direct currents. One of the greatest draft creators, by the way, is any inside door. Jim Hampson tells me that they use double louvres on every door, one at a low point, one high, just so every entrance and exit doesn't create a miniature tornado. The air in a darkroom should flow gently, and in a definite and controlled pattern. Fresh air should be brought in at the dry end of the darkroom and an exhaust port placed somewhere at the wet end. In this way any odors or vapors from the sinks and chemical trays or tanks can get out without moving through the rest of the darkroom.

Special pieces of equipment like dryers that give off heat and water should have special attention, and in many cases should be vented separately. On the subject of moisture, however, it's important to know that humidity control is also very helpful in keeping dust down. When humidity is up, dust is down. Al Peed tells me that many indus-

(continued on page 74)

FREE LITERATURE

For your copy of any free literature, circle the appropriate number on the reader's service card, attached, page 69.

AUDIO-VISUAL

AUTO-FADE 201
Bartlett Research, Inc. 4-page folder illustrates and describes the Cox Auto-Fade, automatic and portable sound-slide system. Lists specifications.

COLOR TRANSPARENCIES 203
Evakta Camera Co. 4-page pamphlet titled "A Method of Reproducing 35mm Color Transparencies," by Joseph Thomas Lappan, Director of the Audio-Visual Dept., Mercy Hospital, Pittsburgh, Pa. It covers the duplication of color slides. Describes and illustrates equipment used to overcome the difficult problem of duplicating pastel flesh tones.

PORTABLE PROMPTER 205
Telit Industries, Inc. TelExecutive folder describes portable, electric, variable speed, speech prompter.

MULTIPLE-SCREEN VISUALS
Eastman Kodak Co. 19-page illustrated pamphlet covers methods of producing both wide-screen and multiple-screen format, applications of wide-screen and multiple screen technique, and preparations of visuals for use on both wide and multiple screens. Called "Wide-Screen, Multiple-Screen Showmanship," (pamphlet S-28), it also points out new audio-visual techniques. Write to: Sales Service Div., Eastman Kodak Co., Rochester 4, New York.

CAMERA & LENS

ZOOMAR LENSES 206
Zoomar, Inc. 4-page illustrated leaflet describes the different models of lenses for Vidicon TV Cameras.

HIGH-SPEED PHOTOGRAPHY 207
Wollensak Optical Co. 4-page, 3-hole punched folder illustrates and describes the Fastax High-Speed Cameras. Defines High-Speed Motion Picture Photography, tells where it is used and what it has accomplished.

PROJECTION HEAD 208
Vanguard Instrument Corp. 4-page specification sheet describes projection head M-70/35/16. Includes such topics as: film capacity; film advance; projection aperture; magnification; power; size; etc.

MINIATURE CAMERA 209
Karl Heitz, Inc. 6-page brochure and 2-sided description sheet on the Tessina Auto-Reflex 35MM Ultra Miniature Camera. Lists specifications, prices and accessories.

SINAR CATALOG 210
Sinar. 23-page illustrated catalog of the Sinar line of interchangeable, Swiss precision cameras for the industrial and professional photographer.

YASHICA CATALOG 212
Yashica, Inc. 12-page illustrated catalog describing the Yashica line of cameras and accessories. Includes such cameras as—Pentamatic (35mm single lens reflex), YF (35mm, rangefinder coupled) and YM35 (35mm, with built-in exposure indicator). Gives features, specifications, accessories and prices.

EQUIPMENT

ANIMATION MOTORS 213
National Cine Equipment, Inc. 3-hole punched description sheet of animation motors with interchangeable adapters for all motion picture cameras.

ASCORLUME CATALOG 224
American Speedlight Corp. 4-page catalog covering the line of Ascorlume Incandescent "Quartzline" Lighting Equipment. It contains technical specifications on the lamps, power control units, light units and accessories which comprise the Ascorlume line.

Meet the demand for continuous processing of WIDE paper

New Pakopak B/W Prosser & Dryer processes and dries roll paper in widths up to 11"

VERSATILE—3½", 5", 8" or 11" width paper can be processed in the new B/W Pakopak at a rate of 48" per minute per strand. Several combinations of listed sizes are accommodated. This rate of output can be increased by addition of a wet section and larger dryer. Processing is done at 85°F.

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For complete details contact your nearest Pako Distributor or write:

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PAKO CORPORATION

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Get more information. Circle 456, page 69

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A two to three times increase in effective film speed at normal developing time, a grain structure and resolution approaching the highest theoretical limit of every film type and brand, an even scale of tones with distinct separation even in deepest shadows and brightest highlights.

You will be delighted with your discovery of Acufine Film Developer.

BAUMANN PHOTO-CHEMICAL CORPORATION
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Get more information. Circle 406, page 69

REFERENCE CATALOG 214
Benson-Lehner Corp. 8-page catalog for record readers, digital plotters, language converters, and photo instruments. Illustrates and gives specifications.

INSTRUMENTATION EQUIPMENT 215
Flight Research, Inc. 8-page, 3-hole punched booklet of photographic instrumentation equipment. Gives specifications and additional information.

WIRELESS MICROPHONE 216
Federal Mfg. & Eng. Corp. Specification sheet for the FME Dual-FM Wireless Microphone.

COLOR PRINT PROCESSORS 217
Kreonite, Inc. Description sheet for the Kreonite equipment used in color print processing. Gives specifications and accessories.

BABY SPOTLIGHTS 218
The Strand Electric & Engineering Co., Ltd. 8-page illustrated brochure describes the Strand line of baby spotlights. Gives specifications and lists accessories and spares.

NEGATIVE IDENTIFIER 219
N. Champion. 6-page illustrated leaflet entitled "How To Identify Your Negatives With The Champion Negative Identifier" tells of the properties, advantages and specifications of this item.

CHROMEGA ENLARGER 220
Simmon Brothers, Inc. Instructions for use of Chromega Enlarger with Macbeth Quantalog EP-1000 Photographic Color Analyzer.

DU MONT CATALOG 221
Allen B. Du Mont Labs., Inc. Catalog of electronic test equipment and oscilloscope record cameras. Gives complete price lists and specifications.

DIAL TIMER 222
Automatic Timing & Controls, Inc. Bulletin N-305B describes the Series 305B automatic reset dial timer. Includes data on construction, installation, application, specialized functions, electrical data and basic circuit arrangements.

FILM TITLER 223
ITT Federal Laboratories. 4-page folder describing a shortcut to film titling. Model 174-B is designed for fast printing of information on photographic film. Illustrated folder gives specifications.

MULTIPLA 228
American Photographic Appliance Corp. Description sheet of the APAC Multipla projection printer for making any size print from 2½ x 3½ to 11 x 14, without removing film.

CINEKING LIGHT 229
Natural Lighting Corp. Information bulletin illustrates and describes the performance and application of the Cineking Light. Also the performance of ColorTran's "Super Kicker" and "Kicker" Lights for powerful flood and fill lighting. Includes lamp performance chart.

COMMENTS ON EDITING 225
Geo. W. Colburn Lab., Inc. Booklet entitled "Colburn Comments on Editing" is a second in a series by this lab. It touches all phases of editing for the industrial firm engaged in or anticipating entering film editing. It discusses and illustrates equipment necessary to start an in-plant editing department, the many preliminary steps in editing, the seven cardinal rules of editing, etc.

DURST D659 226
Durst (USA), Inc. 6-page brochure describing the Durst D659 double-automatic enlarger intended to help professional photo-finishing plants handle increasing demands without a great many accessories. Gives technical data.

PRESTOSEAL CATALOG 227
Prestoseal Mfg. Corp. 12-page illustrated catalog of film and tape splicers and aperture-mounting machines. Gives operation methods and specifications.

X-RAY HANDBOOK 230
The Gevaert Company of America, Inc. 25-page illustrated handbook on industrial X-ray films marketed by Gevaert. Contains comparison tables of five Structurix industrial X-ray films, technical data and sensitometric curves on each of the five films. Includes a section on processing X-ray films, charts showing film sizes converted to square footage, and a table of common logarithms.

TACHOMETERS 231
Epic, Inc. 18-page illustrated booklet describes the Deuta line of miniature tachometers intended for equipment where available space is limited. Describes operation principles, mounting diameters, variation in designs, accessories and complete specifications.

GRAPHIC ARTS

PHOTODRAWING 239
LogEtronics, Inc. 16-page booklet entitled "How to Make a LogEtronic Photodrawing," gives an illustrated step by step process.

PRINTING AND CAMERA LAMPS 240
The Strong Electric Corp. Up-to-date brochure on arc printing and camera lamps of capacities to meet all present-day requirements.

TRANSFER FILMS 241
Ampto, Inc. 4-page pamphlet describing diffusion transfer (photocopy) films for the engineering and graphic arts fields. It is a complete price list describing the company's positive films and the special waterproof negative papers recommended for use with them.

POLYCARBONATE FILMS 242
General Electric Co. 13-page technical report detailing the physical and electrical properties of Lexan poly-carbonate films. This report compares extruded and solvent cast films and lists suggested applications. Includes graphs.

8mm or 16mm Movie DUPLICATES

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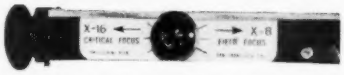
Get more information. Circle 430, page 69



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35mm — 20¢ ea. mtd.
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AUTOMATIC BACKGROUND CONTROL FOR NINE AND TWELVE FOOT SEAMLESS BACKGROUND PAPER
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Burlington, Wisconsin

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OFFSET PLATES 232
Polychrome Corp. 4-page brochure entitled "5 Ways to Use Job-Rated Di-Kote Offset Plates." Also gives imaging instructions.

TYPE COMPOSITION 233
VariTyper Corp. 8-page folder illustrates and describes the various ways in which VariTyped composition is used for printing or duplicating.

TITLING AND ARTWORK 234
S.O.S. Cinema Supply Corp. 4-page brochure entitled "The Answer to Economy in Titling and Artwork" describes TEL-Animaprint—hot press title machine for quality lettering. Lists features.

PHOTO-RAY 235
Reproduction Engineering Corp. Illustrated specification sheet describing Photo-Ray—rotary contact printer. Gives price and uses.

PHOTO-ETCHED PLATES 236
Miller Dial & Name Plates Co. 4-page brochure entitled "The FotoFoil System" describes the process of in-plant manufacturing of etched metal parts using the FotoFoil System. Illustrates steps of operation.

FILM LETTERING 237
Film Lettering. 5-page brochure entitled "You Can Afford Hand Lettering For Less Than The Cost Of Type." Displays available types and uses of each.

GELB EQUIPMENT 238
Jos. Gelb Co. 6-page folder describes the Gelb line of vacuum frames and arc lamps. Illustrates each model and gives specifications.

MOTION PICTURES

MOVIELAB 243
Movielab Film Labs., Inc. 16-page illustrated booklet describes Movielab Film Labs. Describes its services to customers—developing color—B&W, negative preparation, printing, quality control, screenings, and research and development.

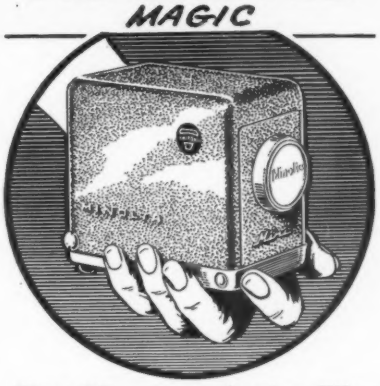
DATA BOOK 244
Morgan & Morgan, Inc. 8-page leaflet reviews the TV & Film Production Data Book by Ernest M. Pittaro. Includes order form for this book.

ARC PROJECTOR 245
Victor Animatograph Corp. 4-page illustrated folder describing the Victor 1600 Arc 16mm Sound Motion Picture Projector. Illustrates the projector's 3-case portability. Gives analysis of parts.

HUDSON EQUIPMENT 246
Hudson Photographic Industries, Inc. Catalog of movie viewers, splicers and tapes. Gives illustrations, specifications and prices.

PROFESSIONAL 8MM 247
Frederick F. Watson, Inc. 4-page newsletter, *Cine Magnetic News,* features an article on the use of 8mm by professionals.

VISUAL AID
MAGIC



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MINOLTA CORP.
200 Park Ave. South • New York 3, N. Y.
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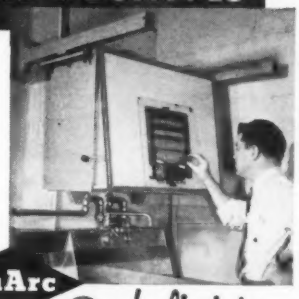
Quick Inspection
OF NEGATIVES AND POSITIVES



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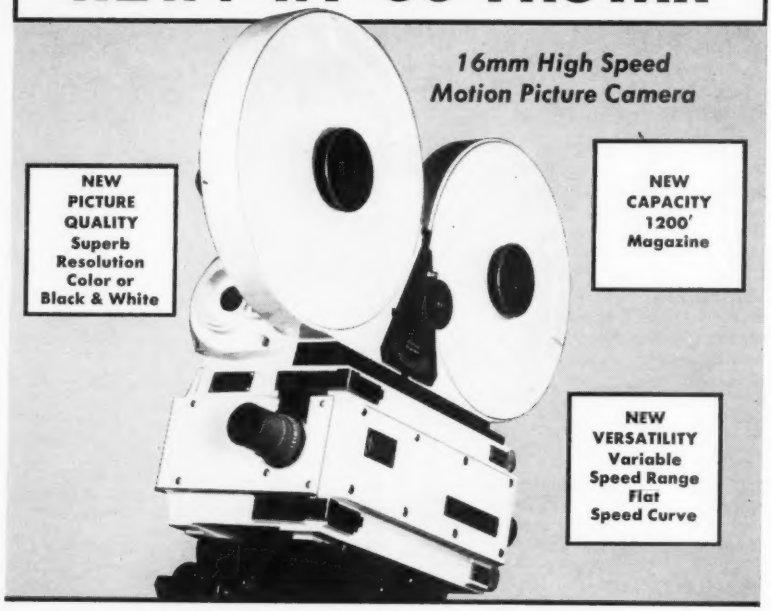
16mm High Speed Motion Picture Camera



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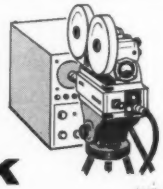

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152 Westbrook Road, Essex, Connecticut

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SERVICES

FILMS ON PHOTOGRAPHY 202
Camera Industries of West Germany. List of films on photography available for company camera club programs.

MODERN SERVICES 248
Modern Talking Picture Service, Inc. 14-page booklet describing the various services rendered by Modern.

ADVICE ON COLOR 249
K & L Color Service, Inc. Self addressed postal card for those who want answers to any color problems. No obligation.

COLOR PRINT SERVICE
Colortronics. 4-page brochure describes the Colortronic method for making Ektacolor prints using LogEtronic equipment. Photographic samples are included. Request on letterhead from: Colortronics, 911 G St., N.W., Washington 1, D.C.

TRADE PRICE LIST 250
Richard Coletti Associates. 6-page folder of trade prices and general information about the Colorlitho Division of Richard Coletti. Includes such topics as Cole color prints (prices for 8 x 10 pictures), publicity use of Cole prints, custom color services, etc.

RECONDITIONING 251
Peerless Film Processing Corp. 8-page booklet describes the Peerless method of reconditioning films.

WIPE CHART 252
Videart, Inc. Wipe chart listing advertising agencies, film editing services, important phone numbers, holidays that may affect production in 1961 and 1962. Also includes conversion chart.

TECHNICAL LITERATURE 253
Camera Equipment Co., Inc. 10-page folder reviewing recent photographic literature. Categorized under Motion Pictures, Television, Sound and Lighting.

SUPPLIES

LEASING EQUIPMENT 259
S.O.S. Cinema Supply Corp. 14 questions and answers about leasing equipment.

PROJECTION LAMPS 262
Sylvania Lighting Products. 4-page folder containing two charts for Tru-Focus replacement; information by lamp type and projector manufacturer.

AGFA PRICE LIST 263
Agfa, Inc. Consumer price list covering all Agfa cameras, equipment, film, papers, chemicals and other photographic supplies sold in the U.S.

PHOTOGRAPHERS' CASES 265
Fibre Products Mfg. Co. 31-page catalog of photographers' and salesmen's cases. Illustrates many types, and gives specifications and prices.

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NEW PRODUCTS

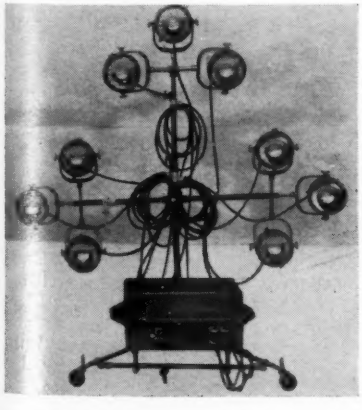
For additional information on any new product circle the appropriate number on the readers' service card, page 69.

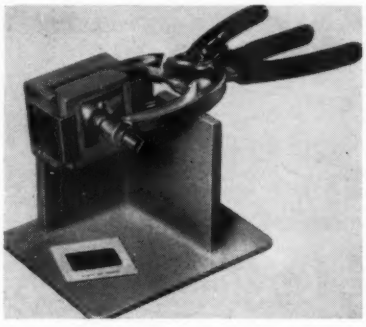
PAKO CLEANING PRODUCTS 101
Two chemical cleaning agents, Poli-Klene and Klene-Ox, have been announced by the Pako Corp. Poli-Klene, a paste-type, combination cleaner-polisher for stainless steel, is said to remove chemical and surface deposits and leave a coating which resists chemicals and water. Klene-Ox is a condensed solution recommended for the cleaning of developer processing tanks and recirculating systems between chemical changes.

AUTOMATIC FILM CUTTER
A machine said to cut any size film from 35mm to 120 with an accuracy of .03 in. has been developed at Eastman Kodak Co. It can cut a strip of negatives at a speed of 2 ft./sec. and can be set to cut every one, two, three or four frames.

DIGITAL RECORDING HEAD 125
A digital recording head for correlating digital data and photographic images on the same photographic film has been developed by FMA, Inc. Mounted inside a camera, the device provides a means of recording instrumentation data such as test parameters along with photography normally required in such operations as missile testing, sled testing or destruction tests. The device converts transducer signals to code suitable for digital photo recording. The test data are recorded on the film through an auxiliary lens system which photographs the digital recording head. Codes can be recorded at frame rates up to 300 frames per sec., according to FMA.

EXPLOSION-PROOF LIGHTS 128
An explosion-proof lighting system, developed originally by the Natural Lighting Corp. for use in the Missile Program, is now available as a catalogue item. The package consists of 9 explosion-proof lights, which house PAR 64 Lamps and two ColorTran CineMaster Converters in explosion-proof housings—all mounted on a heavy-duty "Christmas Tree" stand.





SLIDE MOUNTER 103
The S-M Hand-Easy is a manual slide mounter introduced by Seary-Michelbach Corp., designed for small-quantity slide users. Prices: Model A for 35mm and super slides in 2 x 2 mounts—$49.50; Model B for 2¼ x 2¼ roll film—$49.50; and Model C for lantern slides—$69.50.

MERCURY VAPOR LAMPS 104
The Hanovia Lamp Division of Engelhard Hanovia, Inc., has introduced new high intensity mercury vapor lamps of 200 watts per inch, for use in photo reproduction machines. They are available in 48-in. and 60-in. arc lengths, with wattages of 9600 and 12,000. Lamps with shorter arc lengths may be produced if the demand warrants it.

QUANTASCAN 105
The Quantascan Model 101 Automatic Recording and Analyzing Densitometer, which records the optical densities of photographic test strips—paper or film, black-and-white or color—has been announced by Quantametric Devices, Inc. It features an operating speed of 5 sec. per strip and automatic zero control. Price: $10,000.

MALIBU SADDLE PAK 106
The John Belding Co. has introduced a new photo bag called the Malibu Saddle Pak that features removable compartments which can be attached to the Pak or used as separate accessory bags. Partitioning of the Pak, which is made of "top grain" California Saddle Leather, is also flexible, depending upon individual needs.

FLUOROCARBON BRISTLES 112
Monofilaments made of "Teflon" FEP-fluorocarbon resin are under study by a filaments marketing section of Du Pont's Polychemicals Department for possible use as a bristling material for brushes which face exposure to corrosive elements. Inert to all industrial chemicals, one application for such brushes is seen in photoengraving plants.

(continued on following page)

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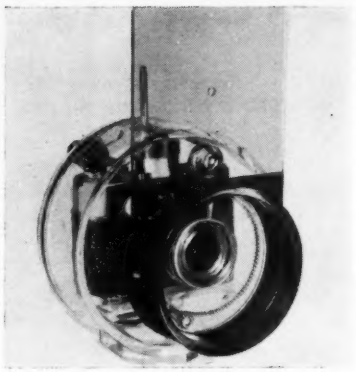


UNDERWATER HOUSING 12

A plastic underwater housing is now available from Karl Heitz, Inc., for the Robot Star II automatic 35mm camera, providing for pictures at depths of down to 100 ft. below sea level. The unit measures 8¾ x 5½ x 4 in. and weighs 1½ lbs. Price: $129.

POLYETHYLENE SPIGOT TANKS 108

A line of polyethylene tanks, equipped with spigots, has been produced by the Redmanson Corp. Available in 20, 32 and 55 gallon sizes, in either rigid or conventional material, the drums have either ¾ or 2-in. spigots.

TIME-O-LITE PRINTER 109

The Time-O-Lite Div. of Industrial Timer Corp. has announced the availability of the Professional Printer Model P-95. According to the manufacturer, exposures as short as ¼ sec. are possible within ±10 millisec. and adjustment up to 15 sec. is possible with no loss in accuracy. Instead of shelving, the printer features an adjustable frame in which the opal glass, used to diffuse the light source, is mounted. With the diffusion control knob, it is said that adjustments of as little as 1/64 in. can be made and dense spots on the negative can be diffused out of the final print. Price: $225.

GRADUATED CYLINDERS 110

The Nalge Co., Inc., has announced a series of Nalge polypropylene graduated cylinders available in 7 sizes from 25ml to 2000ml, said to conform to National Bureau of Standards Class A specifications for dimensions and graduations.

LENS ACCESSORIES 111

Filters and lens accessories, designed to fit the Bell & Howell #310, #312 and #314 Electric Eye Zoom Movie Camera, have been announced by Tiffen Optical Co. Featured are a Hi-Trans screw-in filter ($6.25) and an uncoated HCF screw-in filter ($4.95).

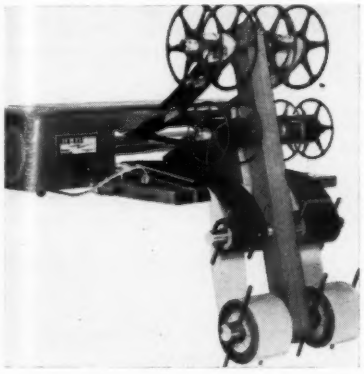
DATA RECORDING 12

Available as an accessory with 4 x film adapter mounted on a Beattie Oscillotron, a new Beattie-Coleman Data Chamber permits a written record on the corner of oscilloscope recording film. The permanently focused optical system is independent of camera lens and shutter. It is battery-powered, or may be adapted to an external power source.

DA-LITE PORTABLE SCREEN 119
A feature designed to eliminate "keystone" distortion of the image from overhead projection has been incorporated in the improved Da-Lite Vidio A projection screen. Produced by the Da-Lite Screen Co., Inc., its keystone eliminator bar holds the top of the projection screen from 2 to 18 in. away from the vertical position. The screen is available in 50 x 50, 60 x 60 and 70 x 70-in. sizes with either mat white or glass beaded surface. A 50 x 50-in. size is available with silver lenticular surface.

SLIDE PROJECTOR LENSES 118
Objective lenses in 22, 24, 26 and 30-in. sizes for the Universal Arc Slide Projector have been made available by the Strong Electric Corp.

MILLI-PROOFER 79 107
A roll-proofing attachment, called Milli-Proofer 79, for use with the Blu-Ray Proof Printer and other makes of diazo rotary whiteprinters has been introduced by Reproduction Engineering Corp. According to the manufacturer, it will automatically proof two 500-ft. rolls of 70mm



or 90mm red proof paper simultaneously. In its operation the rolls of film and proof paper are drawn into the whiteprinter from off the lower spools of the attachment and then the proofed paper and film are returned and automatically separated onto self-compensating take-up spools. Price of attachment: $110.

PANORAMIC CAMERA 117
The Kollmorgen Panoramic Camera has been designed for the purpose of corrosion inspection of plate type fuel elements by the Kollmorgen Corp. In operation, the cluster or subassembly to be inspected is placed in a cradle which is mounted on a carriage. A 45 degree mirror, with dimensions corresponding to those of the water channel to be examined, is inserted from one end. A powerful beam of light is reflected off a beam splitter into the channel from the opposite end, and is reflected by a mirror onto the sidewall. The photographic leg of the system receives the image from the channel mirror and through the beam splitter; and a camera objective focuses the image on the film. The full width of the channel can be recorded on 16mm film at about 8X minification, which can then be inspected through a microfilm viewer or other projection devices.

RECORDAK READER-PRINTER 113
The Recordak Reader-Printer, a microfilm reader which makes paper prints of documents on microfilm has been announced by Recordak Corp. The unit operates with 16mm or 35mm film in roll form, in aperture cards, or in card-size film jackets. Fully automatic in operation, its paper and chemical cost is said to be about 9¢ per print.

SOUNDSTRIP PROJECTOR 114
The Kalart Company, Inc., has announced its "Soundstrip" projector for showing still pictures with related sound messages synchronized with each picture. It contains a 35mm projector, sound scanning mechanism with audio amplifier and controls for both. A loudspeaker is built into the removable cover. The projector can also show conventional filmstrips and, with an accessory slide changer, can project individually mounted 35mm slides.

AUTOMATIC FILM SPLICER 115
The new Acmade Automatic film splicer that makes butt-splices and automatically applies Magic Mylar perforated tape in register on 35mm and 16mm film is being distributed by Florman & Babb, Inc.

COMBI-500 METER 126
The Photo Research Corp. has announced an exposure meter, called the Combi-500, said to be 500 times more sensitive than the average selenium cell meter and 100 times more sensitive than the company's Spectra Professional model.

CLEANING PADS 122
Minnesota Mining and Manufacturing Co. is offering Scotch-brite brand cleaning and finishing pads for use on studio and darkroom equipment. Made of nonwoven nylon, they are said to be resistant to developing chemicals and will not shred, rust or splinter. Size is approximately 9¼ x 6¼ x ¾-in.

COLOR ANALYZER 123
An analyzer capable of reading the color balance of a 20-time enlargement is claimed by Midwest Aerial Photographic Survey, Inc. Called the Speedmaster color analyzer, it features controls that snap into position, permitting an operator to produce additional prints at a future date with the same color balance and exposure as that of originals, according to the manufacturer. Price: $695.

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The Model 55 Fotoeye clips on any Heiland Strobonar (and most other electronic flash units as well) and fires it in perfect synchronization with the master flash at the camera. Needs no connecting cords—will operate up to 200 feet from master unit. Less battery (one may be required, depending on electronic flash unit), priced no more than $19.95.

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SAVE TIME AND MONEY with this broad purpose Photometer . . . combines easy operation, absolute repeatability and most accurate exposure time readings . . . meets black and white measurement needs for contact printing, on easel enlargement exposure, and contrasts for projection papers, including variable contrast papers.

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DUST & DIRT

(continued from page 64)

trial labs who faced intolerable dust problems discovered that when they raised their relative humidity to about 50 per cent they were able to eliminate much of the dust! (Incidentally, at this humidity, films and paper are much easier to handle, too).

Once the physical aspects of dust control are established, we must now face the day to day facts of working in dust-laden industrial plants and trying to keep new dust from being brought into or circulated through the darkroom. Careful cleaning of the darkroom is a necessity. At Modernage darkrooms, and at Life Magazine, walls are wiped down regularly with damp cloths, washed in a thorough housecleaning periodically, too. Oiled sweeping compounds help to gather dust from the floor and to carry it out. Jim Hampson suggests constant use of a dust pan and brush, as well as oil-impregnated rags sold for cleaning.

Perhaps 75 per cent of industrial plant dust is brought into the darkrooms on shoes. Many places install door mats or carpeting at all entrances and require all visitors to use them. At places like Kodak Park, where there are some particularly dust-sensitive areas, sidewalks are hosed down twice a day, even in winter. In summer, dust is even a bigger problem, for it is stirred up by every passing car and sucked into air intake ducts. At one point, Kodak has an aisleway that appears to be damp and is actually a twelve foot long puddle which is kept filled with water to 1/16-in. deep just to flush loose dust from visitors' shoes. Ansco uses wet carpets.

A vacuum cleaner outside the darkroom is standard equipment at places like foundries where photographers and customers are liable to come from graphite laden areas. Cleanliness on the part of each photographer, and a daily mopping of a well designed darkroom will do much to keep dust from being too much of a problem.

One of the big bugaboos in a busy darkroom is the fact that somehow there are always repairs or construction going on while at the same time you're supposed to be making dust-free negatives and prints.

Best way to keep up with this is through constant cleaning while carpenters or plumbers or whoever are messing things up. Modernage uses a large industrial type vacuum cleaner (that has an exhaust that does not blow dust around) and they suck up saw-dust and other dirt as fast as it is made. Some shops insist on repairmen laying down dropcloths whenever possible, so most dirt can be carried out intact.

Len Zoref of K & L tells me they once had a dust problem after some major repairs and helped to trap dust by lightly oiling the floors with a pressurized spray can. Not enough to make floors slick, but enough to keep dust from being scuffed about.

Milt Freier, the Leica trouble shooter, says that he recommends a cute system he once saw for trapping dust after a bout with repair men. He says they lay tar-paper on the floor every day, pick it up and discard it at night for about a week after any dust making activity. It is tacky enough to hold dust which settles on it and keep it from blowing about. It also picks up dirt that falls on the floor at night. I've tried it and it works well.

Another stunt I've seen for settling dust in the air is through the use of an aerosol spray like ethylene glycol which is often used in room deodorizers. This rather heavy spray settles quickly, carrying dust down with it. Care must be taken, of course, that it does not fall on surfaces where it may come in contact with sensitized materials, but it does settle dust and pollen, too. A doctor I know who has an allergy to some kinds of dogs uses just this technique to clear irritants from the air when he has to make house calls!

If none of these things work for you, you might try one of the percipitron-type air purifiers where air is given a static charge and dust particles are caught by collector plates with opposite charges on them.

Above all, everyone who has finally conquered a dust problem agrees: Personal cleanliness and constant care are the prime weapons in fighting dust.

Sort of sounds like a morality sermon, doesn't it?—THE END

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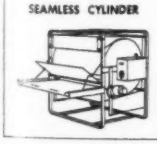

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WEATHER

(continued from page 35)

will still be desirable. With widely fluctuating conditions in an offset pressroom, for example, any number of problems will be encountered in respect to paper feeding, ink dying, linting, offsetting, etc. Needless to say, the losses in production and materials could prove significant. Similarly, in the platemaking department humidity and temperature variations can make the operations troublesome and uncertain. And in this case the defects may not show up until the plate reaches the pressroom. And then a double loss of time and material is incurred. It is no longer a question if a plant can afford to control its atmosphere but, can it afford not to.

Just what type of control will serve you best depends upon many factors. The requirements of the work, obviously, establish the standards to be maintained. The prevailing natural atmospheric conditions, the building involved, the area to be controlled, etc., determine the type of equipment necessary. The situation may call for complete air-conditioning the year round. In more favorable locations (climatically), air-conditioning may only be necessary for limited periods of unseasonable weather. In even more fortunate areas, some simple humidity control may be all that's called for. Such decisions are best resolved by heating and air-conditioning engineers familiar with the complexities of atmospheric control. But the plant personnel must decide what environmental levels are needed.

In most cases, *stability of environment* is of greater importance than achieving a *specific level* of temperature and humidity. Uniformity of atmospheric conditions in all work rooms involved is important in maintaining dimensional stability. Equal conditions should prevail throughout the entire chain of operations from exposure of the film to the printing of the plate. Experience has shown that best results are obtained in various operations when atmospheric conditions are maintained within certain limits. These are shown in the accompanying table. It is apparent that an average condition can be realized in a plant which, while not specific for each and every operation, is at least within, or near the limits indicated. And, fortunately, the average condition that satisfies the chemical and physical consider-

(continued on following page)

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A complete selection of accessories and interchangeable lenses greatly extends the scope of your Heiland Pentax camera. Accessories range from macro attachments to a prescription eyepiece for those who wear glasses. Eleven superb Takumar lenses — among the finest in the world today — range in focal length from 35mm wide angle to 1000mm extreme telephoto.

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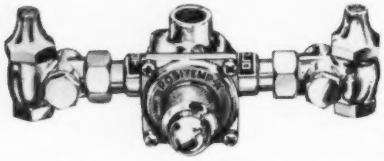

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Get more information. Circle 433, page 69

ations (of the processes and materials), falls within the human efficiency and comfort zones.

The processing of photographic materials is almost universally recommended at temperatures between 65 degrees F. (18 degrees C.) and 75 degrees F. (24 degrees C.) (negative materials, films and plates, are best handled at the lower temperatures, while paper materials can be treated at the higher temperatures), and for very good reason.

Natural laws intervene to preclude working successfully at low temperatures. Chemical reactions slow up as the temperature of the solution is reduced, in fact some reactions stop altogether. The developing activity of hydroquinone, for example, practically ceases below 59 degrees F. Quite obviously, the chemical activity rate, or the lack of it, arbitrarily fixes the lower limits of the processing temperature scale. On the other hand, chemical reactions speed up as the temperature rises, but not necessarily proportionately. In a metol-hydroquinone developer, for instance, the hydroquinone will become increasingly more active than the metol with each degree rise in temperature. From the foregoing, it is evident that, the most satisfactory and uniform results will be obtained when developers are maintained consistently at one specific temperature.

Controlling the wash water may offer some difficulty. If this comes from the mains at temperatures above or below the processing standard it may be necessary to temper it if the materials being processed require uniform treatment throughout.

When the main processing steps are carried out at the 65 degree F. to 75 degree F. range, but the tap is at a higher temperature and must be so used, it is advisable to precondition the materials rather than subject them to an abrupt change. Following fixation the materials are brought up to the higher temperature in several stages—each soaking stage being several degrees higher than the previous one. One of these conditioning stages can be a supplemental hardening bath. The washing period, of course, need not—nor should it—be as long at higher temperatures as at normal levels. Conversely, if the tap water is considerably colder than the processing solutions, conditioning in the reverse order between fixer and wash is desirable and washing time must be extended.

Processing at temperatures higher than the recommended range is, of course, not only possible, but is being done as standard practice in many applications. When it is employed deliberately, it is done so to save time since, at elevated temperatures, processing time can be reduced significantly. It is done out of necessity when temperature control is unavailable or prohibitively expensive.

The problems and defects associated with processing at elevated temperatures are twofold—chemical and physical. On the chemical side we encounter such things as an increase in fog level, a greater tendency for various types of chemical stains, rapid deterioration of solutions, etc. Physical blemishes may include blistering, reticulation, abnormal swelling and softening of the gelatin, prolonged drying time, drying defects and the like. To overcome these deleterious effects, special precautions must be taken. These include modification of the solutions, additives to prevent swelling of the gelatin, supplementary hardening baths and strict control of immersion time.

One of the most serious problems encountered in high temperature processing is the fact that different materials may not have the same temperature tolerance. This means that different materials may require different corrective measures and standards.

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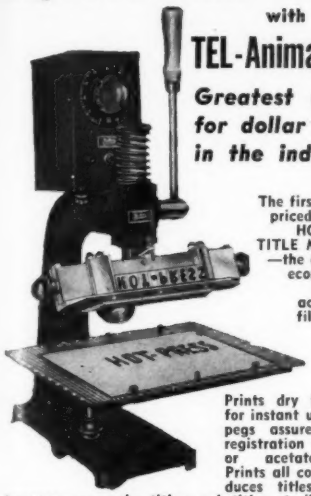

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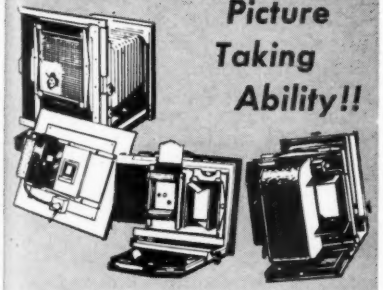

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platemaking generate considerable heat and, in the case of carbon arcs, various gases and soot. Drying cabinets and drum print dryers are also generators of heat and, in most cases, dispel moisture into the air. For obvious benefits in respect to health, cleanliness and a stabilized atmosphere, a separate ventilating system should be provided to exhaust chemical fumes, heat and excess moisture to the outside.

Most modern camera lamps are equipped with a flue vent (if they are not, it is not too difficult to improvise), which can be connected to exhaust ducts by means of lightweight flexible hoses. For stationary lights a desirable arrangement is to provide a hood above the lamp and add a stack pipe from the lamp up to the hood which, of course, is directly linked to the exhaust duct. Another possibility for a lamp in a fixed position, as in platemaking, is to install the lamp in a separate room with its own intake and exhaust systems. A window of heat absorbing glass at the appropriate height and location permits the light to shine through to the vacuum frame. Cabinet type vacuum frames with self contained light sources can usually be vented by connecting a flexible hose between unit and duct.

A separate room is also a logical arrangement in respect to drying equipment. If this cannot be done, a vented hood, as mentioned above, should be provided over each such device.

The exhaust venting system may be of two types. A central system connecting all locations which, of course, requires that the exhaust fan be of adequate capacity and operate continuously. One great disadvantage of the above is that continuous venting not only draws out the locally generated heat, but the general atmosphere as well. This might impose undue demands on the air conditioning system.

A separate system at each point of need may prove more effective and economical. Equipment that is operated intermittently (camera and platemaking lamps, for example), obviously need not be vented except when actually in use. By means of a relay and time delay switch the exhaust fan may be wired in series with the equipment and will then exhaust only when the equipment is in operation, but will continue to exhaust for a predetermined time after the equipment is turned off. This latter arrangement insures that residual heat and fumes are removed.

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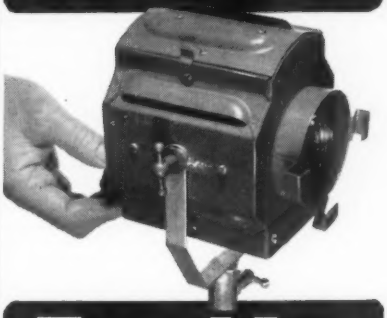

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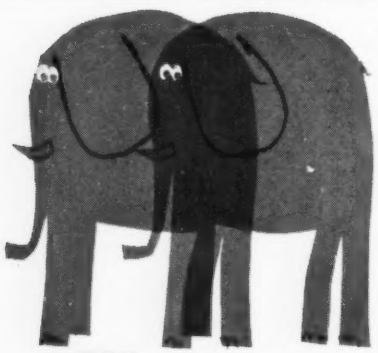

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AGITATION

(continued from page 35)

handle. Above all, he must be reliable and skilled to keep his pace and to avoid damaging the material by scratching or abrading sheets.

Hangers and roll film reels have largely supplanted tray processing in manual film development. Careful technique makes it possible to obtain consistent results with this method. More work can be done, and solution temperature is easier to control. But continuous agitation with hangers or reels is not feasible: flow marks around hanger and reel obstructions destroy the evenness of the image. To avoid this, intermittent agitation is a practical necessity. But intermittent agitation sacrifices the great virtue of tray agitation, consistency through maximum agitation. While slight differences in working methods with tray agitation makes little difference in results, agitation with hangers and reels must be done with clock-like consistency. Since people aren't built like clocks, many mechanical methods of obtaining consistency have been tried. Most are forgotten, but one stuck: gaseous burst agitation.

Announced by Kodak in about 1949, the gaseous burst agitation system seems to be the best answer today for uniform batch processing of films and papers, with a minimum of attention by the darkroom technician. The gas is released at intervals (bursts) through a device called a distributor or plenum, which is a set of interconnected tubes pierced with tiny holes. The distributor is placed at the bottom of a processing tank. When the gas is pushed out of these tubes, a sharp displacement of fluid takes place: the entire solution in the tank rises momentarily and then falls back. In addition, as the bubbles of gas form and rise to the surface, a random agitation is achieved due to the motion of the bubbles. When properly controlled, gaseous burst agitation will approach the quality obtained by the best hand methods.

Nitrogen and air are the two gases used in this method of agitation. Nitrogen has the advantages of being relatively inexpensive, virtually inert to the solutions used in photography and completely innocuous in the small quantities normally released. It is available commercially in two forms. The more common package is a high-pressure cylinder, which is handy and well-suited for the small user. Liquid nitrogen has recently been introduced to the market. It is shipped in insulated containers to keep it at a temperature below –200 degrees F. Liquid nitrogen is convenient for the volume user because it takes but 1/10 of the space of the compressed gas. If not used, however, over a period of time it will boil off into the atmosphere, so its convenience is limited.

Compressed air can be used in all solutions which are not readily oxidized: short stops, fixers, buffers, bleaches, rinses. Any compressed air will do, so long as it is pure air. Some compressors use no oil in their compression stage, and this is the only kind worthy of recommendation.

Whichever gas is used, its pressure must be regulated. The high-pressure nitrogen cylinder requires a two-stage regulator, one to decrease input from an initial 2300 lbs. per square inch to about 15 lbs. of working pressure, the second to adjust and maintain the working pressure. Air compression must be similarly maintained.

In addition to the regulators, a timer and a solenoid valve are needed to supply the bursts. These are available as a package from many manufacturers. The timer should be variable so that burst durations can be controlled from about ¼ to three sec. The interval between bursts should be controllable from about 10 sec. to 2 min. The timer should also have a continuous burst switch that can be operated manually for testing purposes. The timer operates the solenoid which snaps open to full aperature, then shuts instantly to supply the burst.

The effectiveness of this equipment depends on its ability to supply a consistently metered amount of gas at consistent intervals. The intervals depend on the timer. The amount depends on the timer, the accuracy of the valve, and the accuracy of the regulator. One firm asserts that it is also important that the condition of the distributor between bursts be consistent. Their system creates a slight positive pressure between bursts to make sure that no solution backs into the plenum, and that the gas always begins from the same starting point.

A most critical piece of equipment is this gas distributor. If a poorly-designed distributor is used, the processing will not be uniform in any case. A number of suppliers offer excellent units.

Current recommendations are as follows: the bubbles released by

the burst should be about a half inch in diameter. They should be evenly distributed, not favoring one side or one corner of the tank. They should cause about a ⅝ in. rise of the solutions. If these conditions cannot be obtained by adjusting the head pressure going to the solenoid, the design of the distributor should be questioned.

Plastic tubing is usually employed to pump the gas where necessary. All connections should be leakproofed by clamping them. Unless clamped, the hose is likely to stretch in time and eventually leak.

When the above equipment is installed, there is no hard and fast rule for the duration or interval of the burst. The variables are too great. However, the burst duration will usually fall somewhere between ½ to two sec. A shorter burst is usually ineffectual. A longer one will permit the formation of a trail of bubbles from the distributor which causes streaking in the processed material. In addition, excess foaming may take place causing the solution to overflow the tank.

The interval between bursts can be adjusted to give the equivalent of frequent or infrequent agitation. For black-and-white film the best interval seems to be 10 to 20 sec., while for color materials it is usually 20 sec. to more than a minute.

The gas pressure varies with the surface area of the tank and the design of the gas distributor. The rule of thumb is to start with 15 lbs., and adjust till a ⅝ in. rise is obtained. Once a stable rise is obtained, it should be checked frequently. A few clogged holes in the distributor or leaks in the gas supply system, as well as other failures, can affect agitation.

While it would be nice to start the timer, drop the films in the soup and duck out of the darkroom for a smoke, it is not all that automatic. If you have not seen them, you should get and follow the directions for agitation with the 3½ gal. E-3 Ektachrome processing kit. Since they are readily available, there is no point in going into them here in detail. Among other things, however, the recommendations call for hand agitation during the first 2 min. of development. We have found that the system recommended is applicable to all film processing. In fact we feel that nothing short of it will produce truly consistent results.

Consistent, even, results are the only test of a system. When you actually start processing you should check uniformity (and continue to check it at regular intervals). An excellent test is a uniformly exposed sheet of film processed along with regular shots. A shot of a grey card that fills the entire film is fair enough. If this comes out evenly, repeatedly, you deserve congratulations on having a good system.

Suppose, on the other hand, you've got troubles. Let's do some trouble shooting with the most sensitive of the current user-processed color systems, Ektachrome E-3. If your agitation system can handle E-3 well, it is likely to give you excellent results with any film.

Trouble: regularly-spaced streaks along the edge of the film that was at the bottom of the tank. Cause: too rapid immersion in the first developer, or gas discharge too close to the bottom of hangers. Cure: immerse hangers more slowly, and use a hanger rack that will provide at least one inch of space between the hanger and the distributor.

Trouble: Ektachromes have a magenta center and greenish edges. Cause: hangers are spaced closer than ½ in. apart, or film buckled during processing. Cure: replace any bent hangers, use a processing rack which automatically spaces hangers.

Trouble: streaky magenta areas. Cause: uneven first or color developer. Cure: check yourself out on manual, first portion of agitation. Double check to see that you are getting the ⅝ in. rise. Check to see that your burst pattern is even and that the distributor is level, not tilted. Another possibility is mixing of film sizes. It is best to run all of one size through a single cycle. If this is impractical, it may be necessary to buffer sizes with a hanger loaded with an unexposed sheet of film.

This list of E-3 troubles is anything but comprehensive. Other faults can add up to similar or even identical symptoms. But when the list of standard goofs has been exhausted, it may lead you to the answer.

Despite its vexations, which are made most apparent with a sensitive color process, gaseous burst agitation is the only method of obtaining anything beyond experimental production with sheet materials. Someday, something better may come along. In the meantime, the answer for thousands of professional photographers is gaseous burst agitation. While it cannot be employed blindly, used with vigilence and good sense, it is a faithful darkroom servant.—THE END

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